THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIV. No. 592.] LONDON, SEPTEMBER 15, 1874. [26TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL
COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
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WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov. 2, 1866.*
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SPECIALITIES IN WOOD
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PURIFIERS & SCRUBBERS
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JOSEPH COWEN and CO.,
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Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
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THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
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16, SOHO SQUARE, } LONDON
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J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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BELL BARN ROAD, BIRMINGHAM,
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WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
ESTABLISHED 1830.

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CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
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J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.
They are also Contractors for leasing Gas-Works, for supplying, erecting, or repairing gas apparatus and fire-clay goods.
Messrs. ROMANS, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.
Analysis, prices, and other information will be forwarded on application to their Offices, 8, Forth Street, EDINBURGH; 1, Walbrook, Mansion House, LONDON, or to the "Crown Wharf," Thomas Street, Limehouse, LONDON, where stocks of house, steam, and gas coal are always on hand.
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NATIONAL STANDARD GASOMETERS
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MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
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236, GEORGE STREET, GLASGOW; AND 15, MARKET STREET, MANCHESTER.

G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

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ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

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LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

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ESTABLISHED 1840.

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GASHOLDERS AND TANKS,

Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.

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Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.

WET & DRY GAS-METERS,

Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction. (A guarantee of five years given with every Meter.)

PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.

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FIRE GOODS, and Salt-Glazed Drain-Pipes.

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FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

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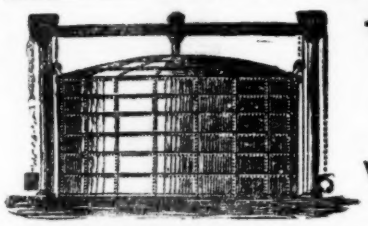
PATENT WELDED WROUGHT-IRON GAS, STEAM, HYDRAULIC, GALVANIZED, & ENAMELLED TUBES & FITTINGS.



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MANUFACTURERS OF

RETORTS, ANNULAR AND PIPE CONDENSERS,

WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS, GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

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GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

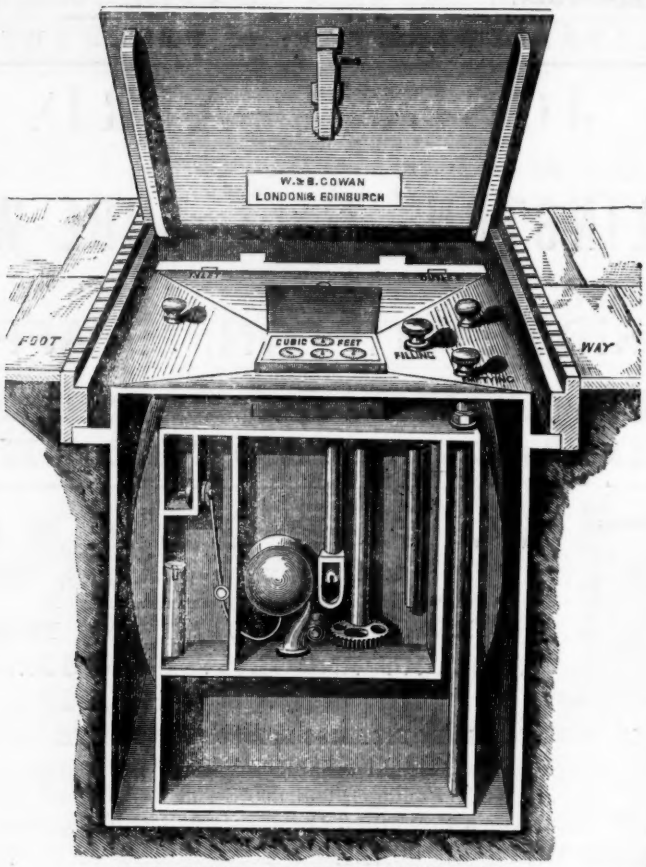
The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

AVERAGE METER SYSTEM

FOR

STREET-LAMPS.



WET METER IN STREET-LAMP BOX UNDER ROADWAY.

The above is offered as the best and simplest arrangement of Street-Lamp Wet Meter, and Box for placing under the roadway.

The index is read, the water supplied, and the overflow-box pumped, without disturbing any inside lid, but only the footway door.

When necessary to take out the Meter, remove the filling and emptying plugs, and the two thumb-screws which secure the inside lid, which can then be taken off, and the Meter disconnected at inlet and outlet unions.

To prevent water entering the box, the inside lid is made raised, and the edges returned over those of the box, and the thumb-screw and index openings are protected by "collars."

The footway frame can be supported either by brickwork or by "lugs" cast on the box.

The Meter shown is on Esson's Patent Fountain Principle, but it will be understood that the same box arrangement is equally applicable to non-fountain meters; and if these latter are furnished with WARNER AND COWAN'S PATENT SELF-REGULATING DRUMS, the long range of water-line renders a fountain superfluous, while the *registration will be practically unvarying;* for confirmation of which, see opposite page.

DRY METER IN STREET-LAMP PILLAR.

WET METER IN STREET-LAMP PILLAR.

FOR PRICES, &c., APPLY TO THE MANUFACTURERS,

W. & B. COWAN,

ESTABLISHED 1827,

KING HENRY'S WALK,
BALLS POND ROAD,
(NEAR DALSTON JUNCTION STATION,) LONDON, N.

BUCCLEUCH ST. WORKS,
EDINBURGH.

WARNER AND COWAN'S SELF-REGULATING GAS-METER.

Certificate by Mr. G. MILLS,

METER INSPECTOR TO THE METROPOLITAN BOARD OF WORKS.

Meter Inspector's Office, St. Ann's Street, Westminster, S.W., Aug. 7, 1874.

GENTLEMEN,—The 3-light Patent Wet Meter sent to this office has been tested by me at ·5 and 1·0 inch pressures, and at the extreme range of the water-lines I find only a difference of 0·62 per cent. in its registration.

I am, Gentlemen, yours obediently,
G. MILLS.

Messrs. Cowan.

Certificate by Mr. G. DETHRIDGE,

METER INSPECTOR TO THE METROPOLITAN BOARD OF WORKS.

Meter Testing Office, Southwark Street, London Aug. 13, 1874.

GENTLEMEN,—I have submitted the 3-light Wet Meter (Warner and Cowan), No. 86, Self-regulating Drum, to the following tests, 18 feet per hour passing through the meter at each test, viz.:—At ½-inch pressure, with the water filled up to the overflow of the waste-box, then at 1, 1½, 2, 2½, and 3 inches pressure. One half-pint of water was drawn off, and the tests repeated; a second half-pint was drawn, and the tests repeated; a third half-pint was drawn off, the tests again repeated; and a fourth half-pint was taken out, with a repetition of the tests.

The results were carefully noted, and a second series of tests were carried out, confirming the original experiments.

The results are appended.

Rate per Hour, 18 Cubic Feet.

Pressure.	At High Water Level.	With Half a Pint off.	With One Pint off.	With One and a Half Pint off	With One Quart off.
5-10ths.	0·20 fast	0·30 fast	0·80 fast	0·60 fast	0·60 fast
10 ,,	0·40 ,,	0·20 ,,	0·20 ,,	correct	0·20 slow
15 ,,	0·20 ,,	correct	correct	,,	correct
20 ,,	0·40 ,,	0·60 fast	0·40 fast	0·40 fast	0·40 fast
25 ,,	0·40 ,,	correct	correct	0·20 slow	correct
30 ,,	0·20 ,,	,,	0·20 slow	correct	,,

Messrs. W. and B. Cowan. G. DETHRIDGE.

Certificate by Mr. HENRY AIREY,

METER INSPECTOR TO THE METROPOLITAN BOARD OF WORKS.

Meter Inspector's Office, White Lion Street, Shoreditch, Aug. 21, 1874.

Gentlemen,—I beg to say I have tested the 3-light Wet Meter (Warner and Cowan's Patent) under various conditions, as stated below, as also the results.

I am, Gentlemen, yours obediently,
HENRY AIREY, Inspector.

Rate per Hour, 18 Cubic Feet.

Pressure.	High Water Line.	Two Gills off.	Four Gills off.	Six Gills off.
5-10ths.	0·80 fast.	0·20 fast.	0·40 fast.	0·60 fast.
10 ,,	0·80 ,,	..	..	..
15 ,,	0·80 ,,	..	..	..
20 ,,	0·80 ,,	..	..	..
30 ,,	0·80 ,,	..	..	0·60 fast.
35 ,,	0·80 ,,	..	..	..

Meter passing 15 feet per hour at low water line with 3-10ths pressure, 1·01 fast.

The tests at variable pressures were only made at high water line, with one exception, it being a matter, in my opinion, of no moment, as any difference would be the result of either an increase of speed or incorrect observation.

Each of these experiments were made repeatedly, with the same results.

Messrs. W. and B. Cowan.

Certificate by Mr. H. SPORNE,

METER INSPECTOR TO THE CITY OF LONDON.

City of London Gas-Meter Inspector's Office, Lower Whitecross Street, London, E.C., Aug. 20, 1874.

Gentlemen,—At your request I have tested your new Wet Meter, and I herewith hand you the results, which are very pleasing.

I am, Gentlemen,
Yours obediently,
H. SPORNE.

Messrs. W. and B. Cowan.

Test of 3-Light Warner and Cowan's Patent Meter, Passing 18 Feet per Hour at Each Test.

Pressure.	At High Water Line.	With Half a Pint of Water off.	With One Pint off.	With One and a Half Pint off.	With Two Pints off.
5-10ths.	0·00	0·00	0·00	0·20 slow	0·60 slow
10 ,,	0·00	0·20 slow	0·20 slow	0·30 ,,	0·60 ,,
20 ,,	0·00	0·40 ,,	0·40 ,,	0·00	0·60 ,,
30 ,,	0·00	0·60 ,,	0·40 ,,	0·00	0·80 ,,

The lights in each were firm and steady.

Certificate by Mr. B. M. M'CRAE,

ENGINEER TO THE DUNDEE GAS COMMISSIONERS.

Dundee Gas Commission, Engineer and Manager's Department, Dundee, Aug. 10, 1874.

Gentlemen,—We received sample meter, Warner and Cowan's Patent 3-light, which we have subjected to several tests, of which the following are the results:—

Pressure.	True Water Line.	Seven Gills off.
5-10ths.	1 per cent. fast.	1 per cent. fast.
10 ,,	1 ,,	Net.
20 ,,	Net.	1 per cent. fast.
30 ,,	Net.	1 ,,

These results are very satisfactory, and prove that said meter, so far as I am aware, surpasses anything that has hitherto been produced.

I am, Gentlemen, yours, &c.,
B. M. M'CRAE.

Messrs. W. and B. Cowan.

Certificate by Mr. R. FERRIER,

METER INSPECTOR, EDINBURGH.

Inspector of Meters Office, City Chambers, Edinburgh, Aug. 13, 1874.

Gentlemen,—I herewith beg to append the results of my testing from the 8th inst. to this date, 5-light No. 183,127, Warner and Cowan's Patent Drum *non-Fountain* Gas-Meter.

These are the average results of many experiments which, I must say, varied very little.

I find that the meter supplies its full quantity, and the valve does not close until upwards of 14 gills of water are extracted.

CAPACITY—Per Revolution ·25 Cubic Feet; Per Hour 30 Feet.

Pressure.	When filled with Water to Overflow.	Four Gills off.	Eight Gills off.	Twelve Gills off.
0·5 in.	0·5 fast.	0·3 slow.*	0·2 fast.	0·5 fast.
1·0 ,,	0·6 ,,	0·4 ,,	Net.	0·3 ,,
2·0 ,,	0·5 ,,	0·2 ,,	0·4 fast.	0·5 ,,
3·0 ,,	0·5 ,,	0·2 ,,	Net.	0·5 ,,

R. FERRIER,
Chief Inspector of Meters, Edinburgh.

Messrs. W. and B. Cowan.

Certificate by Dr. WALLACE, F.R.S.E., F.C.S.,

GAS EXAMINER FOR THE CITY OF GLASGOW.

Chemical Laboratory, 42, Bath Street, Glasgow, Aug. 3, 1874.

I have made a careful examination of a 3-light Warner and Cowan's Self-regulating Gas-Meter, and I have no hesitation in saying that it is the most perfect meter that has come under my notice. The construction is beautifully simple, and the works are not more liable to accidental derangement than those of the common wet meter. While an ordinary 3-light meter gave a variation in the registration of 5 per cent. when tested at the high and low water levels, with a difference of 3½ gills of water, the patent meter, with a difference of 7½ gills, or 62·8 cubic inches in the quantity of water, varied in the registration only 0·2 per cent. These tests apply to the ordinary half-inch pressure at which meters are tested according to Act of Parliament, but an increase to a working pressure of 3 inches gave results equally favourable to the patent meter. The common wet meter showed a variation in the registration by the increase of pressure of 1 to 1·5 per cent., according to the level of the water, while the self-regulating meter gave a variation resulting from the increase of pressure of ·6 at the high level to 1 per cent. at the low level. The greatest error at any pressure and any level of water was, with the common meter, 3·8 per cent., and with the patent meter ·8 per cent.

The following is a statement of the various trials to which the patent meter was subjected:—

Pressure.	Highest Level.	Two Gills off.	Four Gills off.	Six Gills off.	Seven and a Quarter Gills off
Half an inch . .	0·8	0·4	0·4	0·8	0·6 fast.
Three inches . .	0·2 fast	..	..	..	0·4 slow.

Such extremely accurate performance, combined with such an extensive variation in the quantity of water, leaves nothing further to desire in the measurement of gas.

WILLIAM WALLACE.

* In the JOURNAL for Sept. 1 this was printed, in error, as "3·3 slow."

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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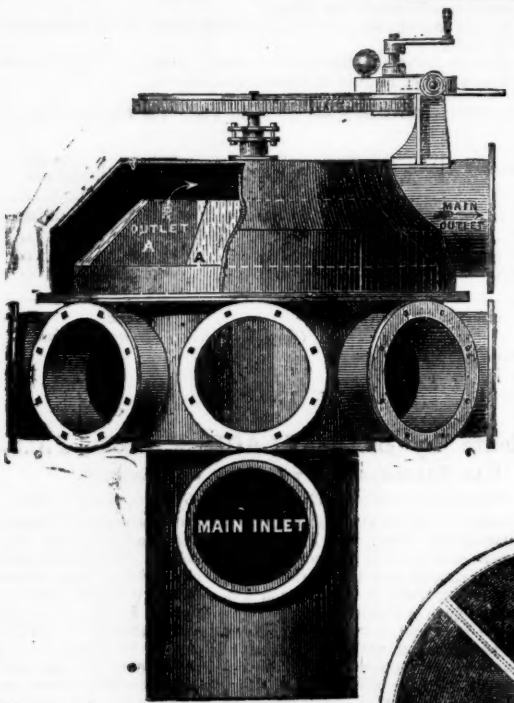
An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

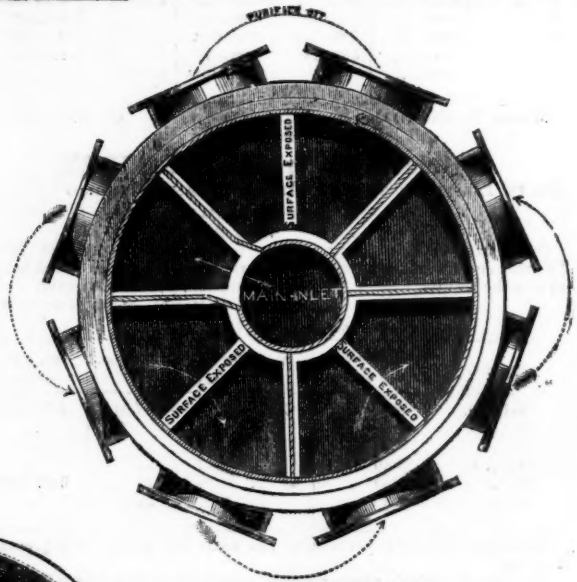
☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

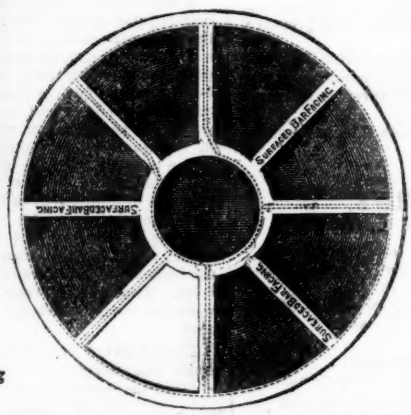
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.

MIDLAND IRON-WORKS, DONNINGTON near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

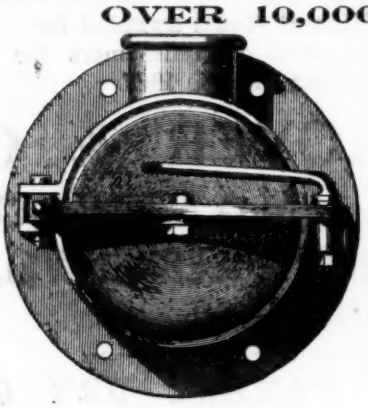
HOLMAN'S PATENT ECCENTRIC FASTENINGS & ANTI-FRICTION CATCHES.

OVER 10,000 IN USE.

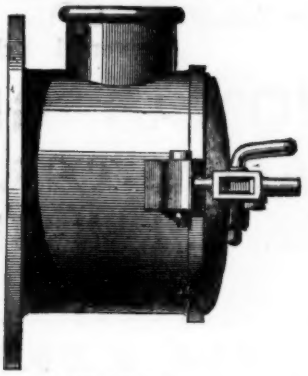
NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW.



SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
" Gaslight Company, Bow Common.	" Imperial Gaslight Company.	" Rochdale Corporation Gas-Works.	" Merthyr Tydfil Gas-Works.
" London Gaslight Company.	" Gas-Works, Arsenal, Woolwich.	" Liverpool United Gas-Works.	" Ystrad Gas-Works.
" Independent Gaslight Company.	" Commercial Gas Company.	" Birkenhead Gas-Works.	" St. Alban's Gas-Works.
" Phœnix Gaslight Company.	" Alliance and Dublin Gas-Works.	" Birmingham Gas-Works.	" Over Darwen Gas-Works.
" South Metropolitan Gaslight Co.	" Edinburgh Gas-Works.	" Nottingham Gas-Works.	" Aylesbury Gas-Works.
	" Manchester Corporatn. Gas-Works.	" Newcastle-on-Tyne Gas-Works.	" Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial has been given:—

THE GASLIGHT AND COKE COMPANY

(Commonly called the Chartered Gas Company),

BECKTON, NORTH WOOLWICH, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly,

(Signed) G. C. TREWBY.

P.S.—We shall have very shortly about 3000 of your Lids in use.

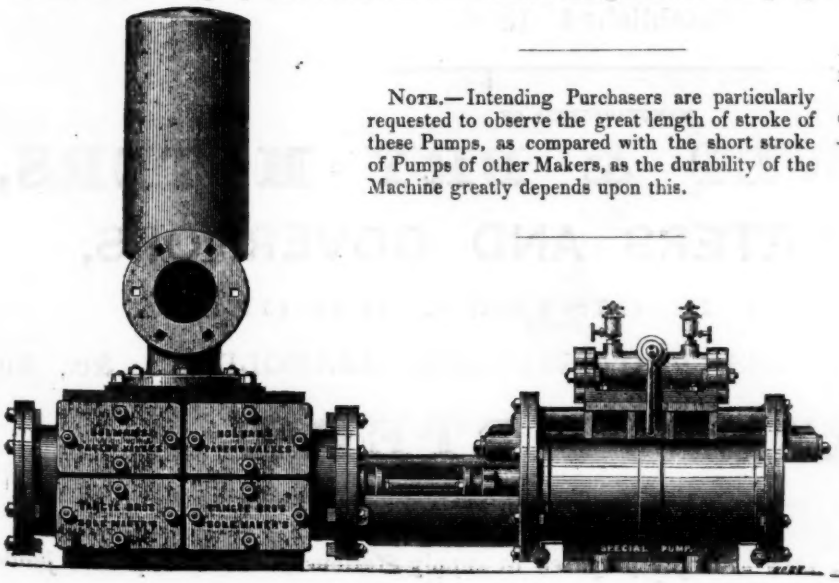
GREAT REDUCTION IN PRICES

OF

THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

Nearly 4000 have been sold since their introduction in 1867.

In use in over Eighty Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.



NOTE.—Intending Purchasers are particularly requested to observe the great length of stroke of these Pumps, as compared with the short stroke of Pumps of other Makers, as the durability of the Machine greatly depends upon this.

The following are a few of the leading Sizes:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons per Hour, Approximate.	Price.
3	1½	9	550	£16
4	2	9	970	18
3	3	9	2,200	18
4	3	12	2,200	20
6	3	12	2,200	25
4	4	12	3,900	25
6	4	12	3,900	30
6	5	12	6,100	35
7	5	12	6,100	40
8	5	12	6,100	45
6	6	12	8,800	40
8	6	12	8,800	50
7	7	12	11,900	50
10	7	12	11,900	65
8	8	18	15,660	65
10	8	18	15,660	75
10	9	24	19,800	90
12	9	24	19,800	110
10	10	24	24,400	100
14	10	24	24,400	140
12	12	24	35,240	140
21	12	36	35,240	285
14	14	24	47,960	180
26	14	48	47,960	450

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

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Established 1816.

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PATENT WET & DRY METERS,

STATION-METERS AND GOVERNORS,

PRESSURE REGISTERS, GAUGES,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

WATER METERS.

W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 15, 1874.

Circular to Gas Companies.

As we suggested in our last, the rumour that the Chartered and Imperial Companies have decided to reduce the price of gas next year to 3s. 6d. per 1000 is not true. As regards the first-named company, we believe we are correct in supposing that the directors will not be compelled to apply for another revision, and therefore the price will fall to the statutory maximum of 3s. 9d. per 1000. It may be taken as certain that this reduction will involve the company in a diminution of profits, the extent of which can at present be only approximately estimated. The price of coal in the coming spring will decide the ultimate result for the whole year, and we can only hope for such a change in the coal markets as will enable the company to make favourable contracts. At the present moment we are bound to say the prospects are not cheering. Coal has undoubtedly fallen in price, but the price is becoming steady. We are inclined to think that, without further disturbing causes, we have reached what may be called the normal price of coal for years to come, and upon that must in the main depend the rate at which gas can be supplied in the future.

As regards the Imperial Company, we may state with confidence that the directors will, if it be possible, and consistent with the interests of the proprietors, fall back upon the statutory maximum; but the event will mainly depend on the price realized for the chief residual during the current half year. There are people who will persistently assert that the enhanced price of residuals will pay the increased cost of coal. For the information of such persons, we may say that the returns of the metropolitan gas companies for the summer months have shown a very different result.

The question will then occur—to what is the general metropolitan consumer to look for further reduction in the price of gas? We may dismiss from our minds all thought of competition with the Metropolitan Board of Works. That will never happen. The time, too—which we know is anticipated by the Government of the day—when the gas undertakings will be vested in a metropolitan municipality, we believe to be distant. The dogged conservatism of the Corporation of London—a conservatism of the stomach rather than the brain, and, therefore, the more difficult to "educate"—and the inordinate vanity of the Metropolitan Board of Works, will, we expect, long stand in the way of an efficient municipal organization for London, without which the acquisition of the gas undertakings is an impossibility. Two allies of the present Government will, next session, try their hands at municipal legislation for the metropolis, one having adopted the scheme of Mr. Beale, which was taken up by Mr. J. S. Mill, the other having a pet scheme of his own, which has been described as a cross between the constitution of the Corporation of London and the Metropolitan Board of Works, and so neither fish, flesh, nor good red herring. To both proposals the influences we have mentioned will present such opposition as will, no doubt, be successful, unless one scheme or the other be adopted by the Government. It may turn out that the Government have a scheme of their own, and in that case there may be a chance of seeing a combined municipality, or municipalities, for the entire metropolis. Failing that, however, and what we may at once admit would be its natural consequence, the gas undertakings in the hands of the municipality, it would seem that the best that could be done for both shareholders and consumers would be to anticipate the consolidation of interests which would result from the absorption of the undertakings by a powerful municipality. This can only be effected by a further application of the powers of amalgamation which the companies already possess, the exercise of which, we have reason to believe, would meet with the approval of the Government. We may admit that further amalgamation may not to-day meet with public approbation. The majority of consumers adopt the shallow reasoning of the committee of the Corporation, and in effect argue in this wise: The price of gas has increased since amalgamation commenced, therefore amalgamation is disadvantageous to the consumer. They forget, or overlook, the changed conditions since 1868, and their attention is concentrated on the only thing they can appreciate—a rise in the price of gas. There are, however, those who look further, and who see in more extended combinations the solution of present difficulties. Whether or not such combination may be brought about, and how soon, depends on a variety of circumstances; but this much we may say, that the consolidation of interests we have spoken of can only result in benefit to both gas proprietors and consumers, while a complete amalgamation would facilitate that transfer to a municipality which some regard as inevitable at no distant date.

The report of the directors of the Chartered Company for the past half year, it may be, will differ considerably from the ordinary run of such documents. It will probably set forth at some length the condition of the company as affected by recent legislation, and vindicate the directors from the charge of raising capital at extravagant rates, and expending it on unproductive works. These matters are usually left to be dealt with by the chairman when moving the adoption of the report, and their treatment in the body of that document would be, to our minds, a valuable innovation. The report always reaches the shareholder, the chairman's speech may not; and it is due to the proprietor that he should be fully acquainted with the circumstances of his company.

The Corporation of Glasgow is unpopular with the gas consumers for exactly the same reason that some London companies are. The Town Council applied to the Board of Trade for power to advance the price of gas, and obtained a Provisional Order, granting them 10d. in excess of their statutory maximum. Even with this addition, however, the council are unable to make both

ends meet. It is no wonder that the gas accounts are severely scrutinized, and not a little blame thrown on the management of the Gas Committee. Not having the complete accounts before us, we are unable to follow the local critics in all their statements. As we mentioned last week, the capital engaged in the undertakings has been just about doubled within four years. In the same time, the consumption of gas has increased one-third. The capital, therefore, would seem to be excessive, although it only amounts to about £5 per ton of coal carbonized. Just as the London consumer cries out about dividends, so the Glasgow man is dissatisfied at seeing 5d. of the price of every 1000 feet going for interest on borrowed moneys, &c. We mention these things to show Corporations hankering after gas undertakings that they must not always expect to be successful. We believe the Glasgow works to be admirably managed, and feel certain that the committee have done the best they could. The prospects, however, are not bright. After next year, and without further legislation, the price must revert to the statutory maximum of 4s. 7d. per 1000; but we doubt whether the committee will find cannel coal much cheaper than it is to-day. The time, we believe, is fast approaching when the Scottish Corporations and gas companies will be compelled to give up the exculsive use of cannel. The statement we quoted last week, that the yield of gas in the Glasgow works was 8535 feet per ton appears to be erroneous. As a fact, only 7200 feet were obtained.

We may next draw attention to the case of a local authority who appear to be successful in their management of the gas undertaking, but still unable to satisfy completely their consumers. The gas accounts of the Keighley Local Board show that a good profit has been earned during the past year, and the Gas Committee, therefore, recommend a reduction of 2d. in the price of gas, and the continuation of discounts, which look to us unreasonable. Large consumers have a rebate of 20 per cent., and a millowner on the Board actually justifies this by the assertion that, in a large concern like a mill, there is a good deal of leakage. Whose fault, we should like to know, but that of the millowner, is this? Another member puts the case very clearly. A large consumer gets a pound's worth of gas for 16s., while a small consumer has to pay 19s. 6d. for it. There is no justice in this, for the leakage will probably be relatively the same in each case. Then the Board support a fire brigade out of the gas profits, for which it is clear the small consumer must pay out of all proportion. In Keighley it would appear, too, that gas profits have gone in support of an unprofitable water undertaking; but this misappropriation is about to cease, as the Board find it necessary to erect new gas-works at a considerable cost, some of which they intend to pay out of surplus profits. We are glad to see a majority of the Board supporting the Gas Committee on the question of a small increase to the gas manager's salary, and we hope they will in time arrive at a knowledge of the proper way of applying gas profits.

The reports of meetings of companies continue to show a fairly satisfactory state of affairs. The Falmouth Company divide 6¼ per cent. on the year, and have reduced the price of gas from 6s. 8d. to 5s. 10d. The Hastings Company pay 8 per cent. on old capital, and 7 per cent. on additional. The Newcastle and Gateshead Company divide only 5 per cent. for the year, and bring down the price of gas to the old price of 3s. 4d. within the borough, with a proportionate reduction beyond the limits. The Queenstown Gas Company are able to pay 6 per cent., and the Sunderland Company pay a maximum dividend on the original capital, and 8¼ per cent. on the additional. Here, too, a reduction of 6d. per 1000 is to be made from Oct. 1, along with a decreased charge for public lights, which will save the Corporation £1000 a year—equal to a penny rate. It will be seen, in another column, that some Scottish companies are making reductions. The Corporation of Darlington have resolved not to reduce the price of gas.

The accounts of the Bradford Corporation Gas-Works for the past half year show, we are told, almost an even balance between receipts and expenditure. This has caused great dissatisfaction in the Town Council, who have been anticipating large profits, for which we expect they will have to wait.

Negotiations are pending for the purchase of the Gainsborough gas undertaking by the Local Board of Health, upon what terms we are not informed.

If public lighting on the average meter indication system is to become general, it is certain that greater attention will have to be paid to regulators. All practical men know that the ordinary instrument of the kind is very irregular in its action; but then it has been argued that with some above and others below the agreed upon rate of consumption, we may get an average regulator consumption which will work out correctly. We should prefer to see regulators which really perform their functions, and, like our correspondent, Mr. H. E. Jones, we are satisfied of the necessity of improvement in lamp regulation.

Water and Sanitary Notes.

We gather from the speech made at Frome by the President of the Local Government Board that it is intended to introduce in the next session of Parliament some measure for the prevention of the pollution of rivers. We need hardly say that any such measure must be closely examined by all towns and manufacturers. That it is highly desirable to improve the state of some of our rivers, we do not for a moment dispute; but care must be taken that conditions impossible of fulfilment are not imposed by statute. The regulations proposed by the Rivers Pollution Commission two or three years ago could rarely be complied with by a manufacturing and general population, and the Thames Conservators very properly modified them. We should be sorry to say anything to set class against class, but it must be well understood that there are riparian proprietors, great and small, who would remorselessly annihilate the industry of a whole district for the sake of some salmon and trout in a stream. We have every respect for salmon and trout; but it must be admitted that they have contributed very little to the greatness of England, while the manufactures which find their proper location on the bank of a river have made this country what we find it to-day. We have little doubt that a Parliament in which manufacturers and corporations are, perhaps, as well represented as land, will look well into any measure the Government may propose. The sanitary aspect of the question we leave for the moment untouched. It would take a volume to expose the exaggerations continually published on this matter. Our sole object, to-day, is to call attention to Mr. Sclater-Booth's speech, and advise manufacturers and towns to be on the alert. Dogged opposition to any measure we by no means counsel; it will be sufficient to prevent the imposition of conditions laid down by scientific *doctrinaires*, which would lead to endless litigation and undreamt-of expenses.

That they manage some things better in France may sometimes be freely admitted, and we are bound to say that the letter of our French correspondent, which we publish to-day, describes an enterprise well worthy of the Municipality of Paris. And yet we have, in connexion with this metropolis, a cemetery established by private means exactly comparable with that about to be opened by the Municipal Council. The cemeteries of Paris have long been a scandal to the city. Utterly insufficient in extent, in dangerous proximity to a crowded population, and placed in most unsuitable soils, it may be fairly conjectured that their pernicious influences add something to the high death-rate of the French capital. Here, where private enterprise has for the most part supplied the want created by municipal inaction, we suffer less, or it may be we do not suffer at all. Our cemeteries are to-day distant from crowded neighbourhoods, but around each one a population is growing up, which will in time be prejudicially affected by the influence of the cemetery. There are, perhaps, but two that can fairly claim to be extra-urban burial-grounds; and the most important of these is that of the Necropolis Company at Woking, which the Town Council of Paris would almost appear to have copied. The soil is nearly the same, the distance from the city about as great. The interments for this metropolis will, before many years are over, require some attention; and possibly before that time we may have a municipality capable of dealing with the question in a comprehensive manner. There are yet some spots within a reasonable reach of the metropolis proper to receive the "human detritus" of this vast city; but what we fear we shall for ever want is, that faculty of organization which, however it may interfere with individual caprices, is, in many respects, a benefit. Funeral processions will continue to straggle about between Brompton and Ilford, and between Highgate and Nunhead, mainly to the profit of undertakers. But some day the burial question will have to be taken in hand in London, and then the arrangements of the Municipality of Paris may be studied with advantage.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XXX.

The Hydraulic Main.

The discoveries of Dr. Priestley in pneumatic apparatus led to the invention of the gasholder by the celebrated Lavoisier, about the year 1790, and to the same source may undoubtedly be traced the hydraulic main, subsequently invented by Samuel Clegg. This apparatus was first introduced by him in 1811, at the gas-works for supplying the cotton-mills of Mr. Greenway, of Manchester; and the following year it was applied to the gas-works at the cotton-mills of Messrs. Samuel Ashton Brothers, at Hyde, near Stockport. If Mr. Clegg had contributed in no other manner towards the development of gas lighting, this invention alone would have been

sufficient to cause his name to be honourably associated with that science so long as it exists, for it is hardly possible to overrate its importance.

The simplicity and efficiency of the hydraulic main, being, as it is, entirely self-acting, requiring no attention whatever, even during a period of many years, not being liable to disarrangement, either by leakage or otherwise, its remarkable security in operation, its moderate price and unlimited durability, are all advantages of paramount importance, which render this apparatus literally invaluable, and utterly indispensable in all gas-works.

The object of the hydraulic main is to serve as a valve, to shut off each particle of gas as produced, so that it cannot return to the retort. In its simplest form it is represented by the accompanying figure:—

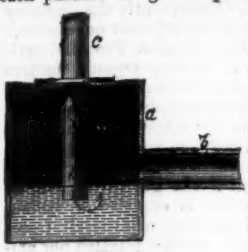

Fig. 1.

a is a section of a cylindrical vessel, closed at top and bottom, having an outlet-pipe, *b*, at the side, the pipe *c* being hermetically secured at the top of the vessel. Within the cylinder is a quantity of liquid, as indicated, into which the pipe *c* "dips" or "plunges;" hence its name, the "dip" or "plunge" pipe. The gas, as produced, issues from the retorts, traverses the ascension and H-pipes, and, on descending the dip-pipe, bubbles through the liquid, and passes off by the pipe *b*. A portion of the vapours, combined with the gas, is condensed at this point, forming tar and ammoniacal liquor; thus the liquid in the hydraulic is being continually renewed, any excess thereof passing off by pipe *b* to the tar-tank.

The vessel thus described, and known as the "hydraulic seal," is also used to indicate any stoppage or back pressure that may exist on the works. For this object one or more of these are placed in conspicuous positions, in communication with the hydraulic main, scrubber, &c., so that in the event of a syphon being logged, or any other obstruction occurring, the gas will blow off from the "seal," and give notice of the same; in this respect acting somewhat analogous to the safety-valve of the steam-engine, but, of course, the gas being a very valuable commodity, it is not permitted to escape, but the defect once ascertained is remedied as speedily as possible.

As generally adopted, the hydraulic main is a cast-iron D-shaped vessel, each length of which is equal to the width of its corresponding setting, from centre to centre of the piers, having dip-pipes for each of the retorts, and every bed being provided with this apparatus. These mains are connected together, and usually extend the length of the retort-house, sometimes being separated by valves placed between two of them, into two or more distinct divisions, each of which is provided with its outlet-pipe for the emission of gas, &c. By these means, in the event of an accident occurring to either of the divisions, it can be detached from the others by closing the valves at the two ends, and any necessary repairs can be executed at leisure.

Fig. 2 represents a longitudinal view of an hydraulic main, part of

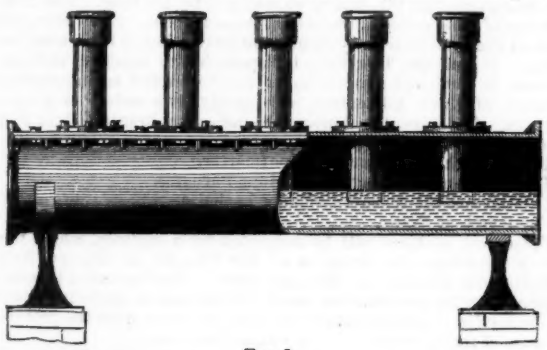
Fig. 2.

which is broken away in order to show the interior; and fig. 3 a cross section. In small establishments they are usually made about 14 inches in diameter, increasing in size according to the extent of the works, the largest being about 24 inches in diameter. They are generally about $\frac{5}{8}$ inch thick throughout, having a flange at each end of about $2\frac{1}{2}$ inches clear, and $\frac{3}{4}$ inch thick, with strengthening brackets 6 inches apart, and bolt-holes cast midway between them. The top part is made flat, for the facility of making the joints of the dip-pipes, and, perhaps, for the purpose of increasing the capacity of the vessel for the passage of the gas, and has the bolt-holes for the flanges of the dips cast thereon.

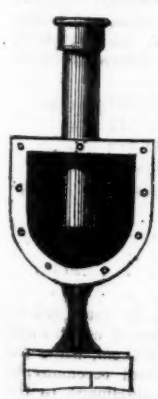
Fig. 3.

The joints connecting these are sometimes made with iron cement, but it is preferable to make them of plaited gasket of the required width, and about $\frac{3}{8}$ inch thick. This is saturated with a mixture of linseed oil and red and white lead, and is then placed with the bolts and nuts, and screwed up securely. This kind of joint possesses some degree of elasticity, and, in the event of leakage, is capable of being easily repaired, an advantage that iron cement, under such conditions, does not possess.

The dip-pipes are universally attached to the hydraulic main by flanges, and their length should be such as to extend about 18 inches above the main. Thus, should the seal be deep, and any extraordinary back pressure occur, the height of the dip-pipe will prevent the tar overflowing at any of these flanges that may be out of action and disconnected from the H-pipes. But when hydraulic seals are in conjunction with the main, this precaution is not so necessary.

The hydraulic main is sometimes made of wrought iron of a thickness of $\frac{1}{4}$ to $\frac{3}{8}$ inch according to its diameter, the flanges being formed of angle iron. In this case they are somewhat altered in form as represented in fig. 4, which is a section of the same. Among the advantages of this kind of construction, is the lightness of the main, and, from the pliant nature of the material of which it is formed, the perfect security which exists against its breaking at the flange, a misfortune that sometimes, although rarely, happens with mains of cast iron when they are in active operation, producing the greatest inconvenience, to say nothing of danger. The difference between the cost of cast and wrought iron hydraulic mains is so insignificant (the former being more than twice the weight of the latter), that we should always recommend the adoption of those of wrought iron.

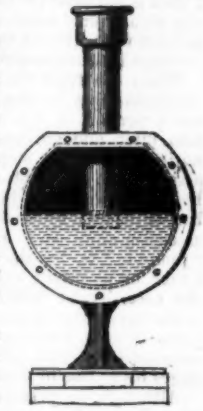
Fig. 4.

The hydraulic main is usually supported by cast-iron stands or "crutches," as represented in figs. 2 and 3, one of these being placed on each side of the flange; but when the main is of wrought iron, one crutch for each flange is sufficient. These crutches are mounted on short brick piers (placed as near as possible over the piers of the arches of the ovens), so that the hydraulic main shall be at a distance of at least 2 feet 6 inches away from the settings, and beyond the influence of their excessive heat. In the early period of gas lighting the hydraulic main was cylindrical, and supported on cast-iron pillars, placed in front of the settings, as already shown; but owing to the prejudicial heat from the flames, when drawing the retorts, and the inconvenience of the projecting columns, this system was abandoned.

Of late years various evils have been laid to the account of the hydraulic main. It is frequently asserted that pitch accumulates therein, and obstructs the dip-pipes; that the pressure occasioned by it is the cause of diminished yield of gas, that it promotes the accumulation of carbon within the retort, and that the gas produced is, in consequence, deteriorated, and by it the ascension-pipes are obstructed. All very serious charges; but how far there is any foundation for them we will endeavour to ascertain. We assume that these alleged defects are supposed to exist only where no exhauster is employed; for it is evident, if that be used, the pressure of the dip-pipes can be removed without any difficulty or expense.

That some of these evils arise, under certain conditions, is beyond all doubt; but we believe they are attributable only to mistakes in the fixing and use of the apparatus. We have seen works where the hydraulic main has been placed directly on the beds of retorts, and these being but ill provided with the means of preventing the radiation of heat, the hydraulic main has been literally converted into a tar-distilling vessel, so that as a matter of course, under these conditions, pitch was formed, and in time the dip-pipes became obstructed by it. This, however, arose from no defect in the apparatus, but in the manner it was applied. If the main had been placed at a reasonable distance from the beds, as recommended, then this evil would not have been experienced.

On one occasion we saw an hydraulic main taken down, after having been in continued use for 18 years, and, upon examination, it showed no deposit of pitch therein, there being simply an accumulation of about $1\frac{1}{2}$ inch thick at the bottom; this was ascertained to be simply dust (so abundant in a retort-house, which undoubtedly had entered by the dip-pipes when disconnected), intermixed with the tar.

However, even under these unfavourable circumstances (for all dip-pipes, when disconnected, should be covered, to prevent the dust entering therein) it would require very many years before this accumulation would be sufficient to cause obstruction. But not only is this unfavourable position sometimes chosen for the hydraulic main, but we have seen the outlet-pipe therefrom actually laid directly on the beds, and, of course, a portion of the tar is converted into pitch, and in the course of time the outlet-pipe will become too small for its service.

It must, moreover, be remembered that when the hydraulic main is properly situated, the temperature of it and its contents are very considerably below boiling point, at which degree of heat only the lightest of the volatile constituents of the tar are evaporated, and pitch cannot be formed. If, on the contrary, the main be placed in direct contact with the hot retort-beds, it follows that pitch will be gradually produced in the immediate vicinity of the heated metal, with its accompanying evils.

With respect to the allegation of the dip-pipe promoting diminished yield of gas, &c., it is true that this would occur to some degree, if, through ignorance, any very extraordinary and excessive pressure exist; but when ordinary intelligence is employed, a seal of one inch or so is all that is required, and this practically has no injurious effect.

Those who prefer these complaints against the hydraulic main appear to lose sight of the fact that there are other causes of pressure on the retort—viz., the pressure of the holder, the pres-

sure required to work the meter, that produced by the obstruction presented by the purifying material, and by the washer, should it be employed; and even that arising from the passage of the gas through the mains, which, when these are too small, is very considerable.

In ordinary works the pressure arising from all these sources may be moderately estimated at 8 or 10 inches, and if only a pressure of 1 inch is required for the hydraulic, it is evident that the removal of this alone would answer no good purpose. And here it may be well to refer to another of the questions much debated in the present day —stopped ascension-pipes, and how they may be prevented.

When the front wall of a setting is of insufficient thickness, the ascension-pipes become highly heated, and, as a natural result, a small portion of the tar, in its passage with the gas, is converted into pitch and adheres to the pipes; this gradually accumulates, until eventually a stoppage occurs. In the meantime the pitch assumes the state of soft friable coke, and as such is expelled by the operation of jumping. This process consists in passing a bar or chisel, by means of a chain, down the H-pipe into the ascension-pipe, and raising and lowering this suddenly, or "jumping" it, for the purpose of cutting away the obstruction—a task by no means enviable or agreeable for the workman, and one the necessity for which is not creditable to gas managers, unless under very extraordinary circumstances. Sometimes the ascension-pipes become obstructed by a mass of pitch, which can only be removed by passing red-hot implements therein; all of these stoppages being due to the excessive heat of the ascension-pipes.

Although we, perhaps, differ from many, we believe that stopped ascension-pipes may be entirely prevented by making the front walls of retort-settings of suitable thickness, never less than 14 inches, and placing the ascension-pipes at a distance of about 6 inches from the wall, if necessary, interposing a plate of sheet iron between the wall of the bed and the ascension-pipes, and taking care that the bent auger is passed at every charge.

Should all these means be ineffective, or should it not be desirable to make any alterations, then the plan patented by Burch upwards of 30 years ago may be adopted. This consists in "placing an inner door-plate or partition within the retort, just beyond the upright or ascending pipe," leaving space around it for the free passage of the gas. The advantages anticipated in the process by the patentee were, "to confine the heat within the retort as much as is practicable," and "the effectual prevention of the choking or baking up of the ascending pipes." That economy of fuel would be effected by the second inner door to each retort, by the reduction of the radiation of heat at the mouthpieces, is unquestionable; and we have the conviction that, by the adoption of this means, stopped pipes would be rare. But against this has to be set the labour of taking out and replacing the door at each charge; and, as a rule, engineers are not disposed to admit any increase of labour, even although it should be amply repaid by the results. In the writer's experience, during several years, after taking the ordinary precautions mentioned, as regards the position of hydraulic main and thickness of walls, he was never inconvenienced with stopped ascension-pipes, and he believes he has indicated remedies so as to effectually prevent them.

(*To be continued.*)

PUBLIC LIGHTING AT DROGHEDA.—After a period of twelve months darkness, Drogheda has been relighted with gas, the gas company having entered into a contract for supplying the public with gas at an expense of 41s. 6d. per light, or 1s. per lamp under their former price.

COVENTRY WATER SUPPLY.—At the meeting of the Midland Counties Committee of the Association of Municipal and Sanitary Engineers and Surveyors in St. Mary's Hall, Coventry, on the 29th ult., Mr. Purnell, the city surveyor, read a paper descriptive of the Coventry Water-Works. He stated that the first well was sunk in November, 1856, and was 195 feet deep. In September, 1860, another well was sunk 300 feet deep, which yielded 240,000 gallons per day. The total yield per day now was 600,000 gallons—60,000 of which were from surface springs, and 60,000 filtered from the Barley Brook, near. The water was pumped out of the tank into a 14-inch main by a 60-horse power engine. They supplied 3016 houses, and 4300 water-closets. The works cost £33,000. The quality of the water, according to analysis by Professor Miller, was good. Hardness before boiling, 10·9; after, 3·7. Total solid matter, 19·26; total gases in solution, 15·22; proportion of oxygen to nitrogen, 1 in 2·69. The average yield for the last ten years had been 235 million gallons, and the consumption of coal had been 680 tons.

THE RAILWAY COMMISSION.—A report has just been issued by the Railway Commissioners in which they sum up the work done by them since the constitution of their court. Referring to the case reported some time ago in the JOURNAL, in which it was alleged that the Lancashire and Yorkshire Railway Company gave an undue preference to the Corporation of Manchester in the forwarding of coals to their gas-works, the commissioners remark that "the Act of 1854 applies to every kind of inequality of treatment, and railway companies must not only not show a partiality to themselves, but must not make an undue difference between their customers, nor give to one or more of them advantage or convenience which they will not give generally. The case of *John Lees and others v. The Lancashire and Yorkshire Railway Company* was one in which the plaintiffs complained to us of the railway company for giving the Corporation of Manchester an accommodation which the company would not give to them, and sued for an injunction to the company to treat them similarly to the corporation. The accommodation in question consisted in the company continuing to carry coals to the Oldham Road station in Manchester for the gas-works belonging to the corporation after they had removed the depôt of their coal traffic from that station to one farther away—viz., at Miles Platting—and had refused any longer to carry coals for Lees or other dealers to Oldham Road station, or any nearer to Manchester than Miles Platting. We found that the company had reasonable grounds for separating their coal and goods traffic, and removing the former from the Oldham Road Station, and had also reasonable grounds for making an exception in favour of the corporation, as it was made in the interests of the public, who were benefited by the coal supplied for lighting Manchester being carried to a station close to the gas-works, and was not an advantage to the corporation by which Lees or other coal dealers were or could be prejudiced; and we decided accordingly that the company had not done anything by which the Act had been contravened."

Communicated Article.

THE PARISIAN CEMETERY OF MÉRY-SUR-OISE.

(FROM OUR PARIS CORRESPONDENT.)

(*Concluded from page* 302.)

The new cemetery of Méry-sur-Oise will be established in a real desert on the sandy plains comprised between Herblay, Pierrelage, and Méry. There are there at least 2000 hectares (5000 acres) of barren land in one piece, without a single habitation; on a surface of 6000 mètres by 4000 mètres—that is, an area of 2400 hectares—we meet with only a few farm buildings. Consequently the cemetery is far removed from any chance of injury to an adjacent population.

The soil of the cemetery is formed entirely of sand. Practical agriculture proves that these permeable soils destroy organic matters twice as quick as close, heavy soils; for dung buried in the former is absolutely consumed at the end of two years—nothing remaining—neither humus nor ammoniacal products, nor nitrates. We may be certain, then, that at Méry nothing of a body, except, perhaps, some bones, will be left after the expiration of five years. If the burials are only renewed every thirty years, and if the graves are dug so wide apart that only a fourth of the extent is occupied by bodies, scarcely a twentieth of the surface of the cemetery will contain traces of organic remains. The rest will contain neither nitrated nor ammoniacal products, nor, for a stronger reason, any trace of carbon or organic nitrogen. If the area of the cemetery be 800 hectares (2000 acres), only about 40 hectares (100 acres) will contain traces of human detritus; and, if the cemetery be worked with intelligence, this detritus will be disseminated in small groups, and no more injuriously affect the subsoil water than the manures which the farmers bury over the whole extent of cultivated land, without our ever finding either ammoniacal products or nitrates in the waters which have passed through the soil.

The annual number of burials in Paris is about 50,000. The weight of the 50,000 corpses will certainly not exceed 3000 tons. The area of the proposed cemetery being 800 hectares, the average weight of the nitrogenous organic matters buried in each hectare will not be more than four tons a year. This quantity is so small that no infection of the soil or subterranean water is to be feared, especially if care is taken to prevent crowding of the graves.

The site of the cemetery having been fixed upon, it remains to organize the transport to Méry, which lies at a distance of about 12 miles from the circle of Paris. The Municipal Council have as yet only decided on the principle that a special railway shall unite the cemetery with Paris, requiring further information as to the means of execution. There is little doubt they will accept, in its entirety, the plan proposed by M. Alphand, of which we proceed to give a sketch.

In order that the distance of the cemetery of Méry-sur-Oise shall not impose an unnecessary loss of time, it is desirable that the route of the funeral *cortéges*, or of persons leaving the church, the temple, the synagogue, or the house, should not be too long. The mean distance of the *arrondissements* to the cemeteries which serve for them at the present time is about 3400 mètres (say a little over two miles). It appears, therefore, indispensable to establish mortuary stations in sufficient number so as not to exceed an intermediate distance of three kilomètres (say nearly two miles) as a mean distance. Consequently it would be necessary to establish at Paris four of these stations, viz:—

The first at the cemetery of Montmartre.
The second at the cemetery of Mont-Parnasse.
The third at the cemetery of Père Lachaise.
The fourth at Passy.

These four stations will be connected by a railway, which then nearly following the direction of the Chemin de Fer du Nord, will conduct directly to Méry-sur-Oise. The base of a thorough organization for the cemetery work will depend on the requirements of the service. It is, therefore, necessary to know what the probable number of trains would be to serve each mortuary.

The number of burials in Paris, in respect to 1872, which may be considered as a normal amount, was 41,569, which gives a daily average of 114. Supposing that the average of funerals from the four mortuaries be proportional to that of the population, and taking returns according to the decree of Dec. 31, 1872, the population of Paris would be 1,851,792 persons, divided as follows, between the areas assigned to each mortuary station, viz.:—

Montmartre station	. . . . .	729,899 persons.
Père Lachaise „	. . . . .	583,547 „
Mont-Parnasse „	. . . . .	441,379 „
Passy „	. . . . .	103,818 „

Consequently, the daily number of funeral *cortéges* would, be approximately, as follows:—

From the first mortuary	. . . . .	45
From the second „	. . . . .	36
From the third „	. . . . .	27
From the fourth „	. . . . .	6

Each train starting from these stations might be composed of 13 carriages, some entirely devoted to the conveyance of corpses and families who would not wish to be separated from them, while the others would receive persons invited to the funeral ceremony, as well as those who might desire to make a pious pilgrimage to the cemetery. To quiet one of the keenest anxieties raised by the question of the transport of the dead by rail, it is necessary to give up the idea of placing the bodies in ordinary trucks, where they would be isolated from the families. Unless in the rare case of epidemics, which would justify exceptional measures, it is well that

the families should not be separated from the coffin which they accompany, whether they occupy a compartment attached to that containing the corpse, or whether they take their places in carriages corresponding to the class of tickets placed at their disposal. In either case, it is important that they should be completely isolated, so as to avoid all danger of mistake from promiscuous mixture. They should be allowed to mourn their dead, sheltered from the gaze of impertinent curiosity, and in the seclusion always sought by real grief.

The problem is easily solved by constructing special carriages divided into one, two, or three compartments. These compartments should be completely separated by partitions, so that each family, whatever the class of funeral, might occupy an isolated space sufficient to receive the coffin on a bier, and with seats for eight or ten persons. According to the means of the families and the price paid, they might either occupy an entire carriage, or share one divided into two or three compartments. Parish funerals, for which no charge will be made for the conveyance of corpse and followers, will, nevertheless, enjoy the same privileges as the lowest paying classes.

Under these conditions a train of 13 carriages might be made up, first, of five for the conveyance 13 corpses and the mourners; for the proportion between the interments of the three first classes which might require an entire carriage, of the three second, which would take a carriage divided into two compartments, and of the three last, which as well as the gratuitous funerals, would take a carriage divided into three compartments, is shown in the following figures:—

Burials of the three first classes, in 1872		514
„ „	second classes, do.	6,342
„ „	third and gratuitous classes, do.	34,713

which gives a mean of 13 biers for five carriages. Six others, of which one would be first class, two second, and three third, with two trucks, would complete the train, and convey the persons who followed the corpses, and visitors to the cemetery to pray on the tombs of those they hold in dear remembrance. The number of trains thus formed, leaving the Montmartre station, would, on the data already given, be at the rate of four per day, and from Père Lachaise three trains; Montmartre, three trains; and Passy, one train. The time required to reach the cemetery would vary from 40 to 60 minutes.

With this organization, despite the wide-spread area of Paris, which amounts to about 12 kilomètres in length, and about 9 kilomètres in diameter (the smallest), the passage from church, house, &c., to the nearest mortuary station, would not exceed three kilomètres. Arrived at the stations, the hearses would enter into the interior, and the coffins would be immediately received in the waiting hall, converted into a chapel, to pass eventually into the conveyance allotted to them. The families and the undertaker need not quit the coffins for one moment, but follow them to the place of interment.

The entire arrangement of the plan will respect religious feeling of the most scrupulous kind, and will not invade that sanctity which has hitherto distinguished former funeral arrangements.

The Municipal Council has decided to open a competition for studying the best means of effecting cremation, on which we shall offer some remarks, when the programme of the competition is made known.

Correspondence.

GAS PURIFICATION.

Sir,—Is it not a glorious thought, that in so short a time as 60 days, the later published proceedings of the British Association of Gas Managers should have travelled so far as Pernambuco, and we should have back the thoughts in print of our dear friend Newbigging, as contained in your last issue?

But is it not equally an inglorious thought that your pages have contained no authenticated criticisms, such as he gives, of the paper I read on the above subject, from "all the talents"—to borrow a phrase of yours—nearer home, who with ample opportunities have failed to criticize?

Mr. Newbigging thinks that we were so happy a family that no one could screw his courage to the sticking point, to stand up and attempt to controvert the statements set forth in my paper.

With every respect to the kind nature of our at present absent, although by no means forgotten, friend Newbigging, I think here he is wrong, for, from my past experience of what I have said or done at these meetings, there are people who would have got up, if they thought they could have done so with credit to themselves.

I have not forgotten on a former occasion being told from the chair that there was too much *acid* in a paper which I read on the *alkali* ammonia, because I had the courage—which is merely an animal instinct—to hint most gingerly, and as I thought humanely and humourously, at the bad condition of things in some of our "model works," which were to surprise the world once they were finished.

He is no friend who holds his tongue when he thinks he has anything to say, and I hope the gentlemen who compose, or who may yet compose, the body called the "British Association of Gas Managers," will never descend to that make-it-all-round-comfortable sort of doctrine, for fear they should displease some one who may have got himself put in large letters on the programme of the day.

We have had, and may have still, some small fry who thus trim their sails to the passing wind, but they have no real influence, and there is too much independence, especially amongst the country members, for the general body to cry boo to every goose, who may speak as he thinks on their behalf.

On behalf, therefore, of my brother members, I solemnly state that I do not think—at least, so far as I am concerned—that there was any squeamishness which led to the rather meagre discussion, lamented by both Newbigging and Anderson; and, what is more, I would not thank any man, nor think him either my friend or the friend of the society, who did not stand up and say what he thought—provided he had thought first.

I shall on all occasions, when I think the matter important, speak out what I have thought, no matter who it hits, and it is only by doing so that our society shall earn a title to support, which I believe it receives, from many men and young minds, who want the truth spoken and a general spread of correct information.

Everything connected with gas, in all its ramifications, cry out that we want no more old fogeyism nor mere authoritative statements. We want proofs, we want facts; we do not give a rap for mere authority.

Some gentlemen are kind enough to write of me as an authority on gas purification. Unless I support my statements by facts and proofs I disclaim the title; if I do, I demand it, ever ready to lay it down at the feet of him who produces the latter claim.

I have been led to those remarks in case there be some truth in what Mr. Newbigging surmises. It must never even be thought that the gas managers succumb to a man or to an authority. I love an *honest* foe. I detest that maudlin sentimentality that slurs and ha—ha—s over the lashes of a friend.

In science we should remember only truths and forget friendships. Like the men of the ring, we should shake hands before we begin; forget all that, and go at it with all our might while we can, and when we are done, if we are able, shake hands again.

I can understand, for I have felt it, that a man may disagree from conclusions presented to him without being able at the moment to controvert them, and on that account gentlemen may have been silent, although unconvinced.

I did what I could to prepare the minds of gentlemen by publishing in the Journal of Gas Lighting, a month or two before, the heads of what my paper would contain. If after this unprecedented course I still failed, I presume the pages of the Journal of Gas Lighting are open, and I know of no better medium in which the subject could be thrashed, and the pure grain collected. Mr. Newbigging, I think, has not caught the gist of my paper. If he will do me the kindness to read it again he will find that I laid no stress on lime *versus* oxide of iron as a purifying agent, and probably this may go far to account for the president's aquiescence.

I maintain, however, that lime is a better purifying agent than oxide of iron. I also maintain that by it I purify gas with less smell to the neighbourhood than I find where oxide of iron is used. I also maintain that the outcry which has justly arisen against the use of lime has arisen in consequence of the ignorance of parties as to the best mode of purifying gas, and I think all this is stated or may be inferred from my paper.

While giving evidence lately in the House of Lords on gas purification, I had under the noses of all present a lump of foul lime about a foot cube (for I lay it on my purifier trays in about that thickness); and so void was it of all smell, that no one discovered its presence till I laid it before me on the table; and then, although every one saw it, no one smelt it.

But for its late arrival, I would have had at the meeting of gas managers about half a cubic yard of foul lime, which Mr. Travers, the manager, sent across from Cork for the purpose of illustrating his remarks. It lay in my office for a month with the lid open, but it did not taint the air of the room. My contention is that purifiers are made to do at great cost inefficiently, what washers, or scrubbers either, separately or combined, would do more efficiently, and at much less cost.

I further contend that the usual method of using scrubbers, by pumping the liquor frequently through until it has arrived at the saleable strength of 5 or 6 or more degrees "Twaddel," is an absurdity—will not purify gas from ammonia, unless in part; and unless the gas is brought into contact with pure water—a practice I have heard "eminent" engineers condemn—you will neither purify your gas from ammonia, nor, by consequence, catch it for sale.

My advocacy of the washer commenced after my experience of the washer I designed, and only applies to it.

Mr. Newbigging, during 17 years experience, did not find the washer capable of removing all the ammonia. I have found the same thing; and, because I did, I designed a washer that would divide the gas into numerous small globules many times in its passage through—hence the success.

I cannot make the distinct statement Mr. Newbigging wants as to the washer taking out all the ammonia, because I have only added washers to works already provided with scrubbers; but I infer, from the large quantity of ammonia which one washer charged with weak ammoniacal liquor does take out, that if I had one charged with pure water to finish with, I should remove the remainder; and, as a washer does not cost half so much as a scrubber—as it is a flat vessel not requiring the water to be lifted more than 6 or 8 feet, whilst, in many scrubbers, it has to be lifted 50 feet—and as the washer is a self-acting machine, and requires no machinery—for all those reasons I prefer it, while, at the same time, I also think the scrubber is a very useful vessel, and, under intelligent guidance, can be rendered very effective in its action.

I quite agree with Mr. Newbigging as to the desirability of not reducing the temperature of the gas too low during purification, in case you should throw down its carbon; and I think, if Mr. Newbigging will consider this point, he will conclude with me, that here the washer has an advantage over the scrubber, because, if necessary, you can reduce the condensation before the gas arrives at the washer, as it matters not to it, although it were made to partly act as a condenser. The tar will flow off with the ammoniacal liquor, but it is necessary to proper scrubbing that your condensation be finished before the gas enters the scrubber.

I do not know what Mr. Newbigging refers to, in his remarks on the superiority of having several, instead of one layer of lime in a purifier. In common with others, I have always used several layers, but lately, where the purifying surface is large, I have used it of an increased thickness, and I find it fouled to the centre.

I thank Mr. Newbigging for his criticism, which thus enables us to shake hands with our friend now on a distant continent, and assure him, as I think I may do, that his observations on gas matters will always be relished by his brothers in the old country.

4, *Cannon Row, S.W., Sept. 5*, 1874. George Anderson.

Sir,—Mr. Newbigging, in his communication on purification, in your issue of the 1st inst., having on the score of economy questioned the propriety of allowing so much as 6 superficial feet of purifier area per 1000

cubic feet per 24 hours, as suggested by me in my remarks upon Mr. Anderson's paper, at the annual meeting in June last, and as my remarks in that connexion were not fully reported, perhaps you will allow me a few words in reply.

My object in giving 6 square feet of area was exactly to draw the maximum line which Mr. Newbigging says should be drawn somewhere, since it will be remembered by those present that, in connexion with this rule, I named the amount of impurity in the foul gas which that area would economically remove, and which, had it been reported, would have made the matter more easily understood. The impurity I attached to this area was 4½ per cent. (CO_2 3½ and H_2S 1·0), or 2 square feet to every 1½ per cent., allowing the nature of the coal and the purifying materials employed in any case to determine the required area.

In many works, however, with moderately dry coal, and the ordinary washing apparatus, the average will be found not to exceed 3 per cent. at the entrance to purifiers, in which case 4 square feet only would be necessary. And, again, in the case of those works where the removal of the carbonic acid is not attainable on account of the obligation to exclude the use of lime as a purifying medium, 2 square feet of area would be ample, and thus considered the apparently excessive power (as viewed by Mr. Newbigging) is made to disappear.

In connexion with this rule, which I base upon practical observation, my special aim was to point out the importance of determining the power of the purifiers by the amount of work to be performed, and not as has hitherto been the practice, and as existing rules alone recognize, by the volume of gas to be passed through them (which manifestly is but the carrying medium of the compounds to be removed), but by the proportion of the impurities to be removed and the volume together.

The power in relation to volume may everywhere be uniform and constant, but that power, in relation to impurity, may vary 800 per cent. in different works, if we include the removal or non-removal of carbonic acid. What disappointment, therefore, may not often follow the general adoption of rules which disregard such important facts? With this exclusive volume theory, need I add that it is necessary only to combine that of tray surface, as the exponent of power, to crown the error or complete the misfortune?

With regard to the number and size of purifiers suggested by Mr. Newbigging, as large area in each purifier is a point to be aimed at, in order to reduce the velocity of the passing gas to a minimum, instead of distributing the 24,000 square feet of area required for 4 million cubic feet per day, carrying 4½ per cent. impurities, according to the rule, over 10 or 20 sets of purifiers, six sets of three working purifiers, each 36½ feet square, would be a more profitable arrangement; or, in the case of 3 per cent. impurities, four such sets; and lastly, in the case of the CO_2 being left in the gas, two such sets would be ample, and in accordance with the rule which I suggested.

Finally, with regard to cost. The result of the adoption of this rule, as against the existing published rules, and especially where the removal of the carbonic acid by lime is effected, would be a saving of ½d. per 1000 cubic feet (I believe I am within the mark) between material and wages on the year's working; and, allowing the annual production of a work requiring 4 million cubic feet per day in midwinter (as instanced by Mr. Newbigging), equal to 660 million cubic feet, "it works out to" £1375 per annum! a sum, I should think, sufficient to give a return upon the increased capital and land area required, with the addition of a bonus to the shareholders.

Paisley Gas-Works, Sept. 10, 1874. GEO. R. HISLOP.

MR. CATHELS ON CONDENSATION AT SYDENHAM.

SIR,—"Circumstances over which I have had no control" (which fine phrase being interpreted subsides into the common-place explanation of want of time) have prevented my sooner noticing the paper on "Condensation, and its Effects on the Retention of Naphthaline," read by Mr. James Watson, of the Sydenham Gas-Works, at the late convention (to use a this-side-the-water expression) of the Gas Managers Association in London. This I am induced to do, with the view to making certain corrections and explanations in what is advanced therein. But, first of all, why should I in particular take this trouble? Simply because it so happens that it falls to my lot to be responsible for the condensing arrangements dragged into, and commented on, in the paper.

As it appears to me, Mr. Watson, while contrastively proclaiming his superior managerial abilities, which, of course, are not to be disputed, would seem to be-little these arrangements, while at the same time he takes credit for their beneficial results.

It is an historical fact in connexion with gas lighting, or rather gas making, new, I apprehend, to the majority of the fraternity, and for which that gentleman deserves a niche and "that sort of thing," that he was the first to adopt the plan of cooling the gas in the same pipe with the liquid overflow of the hydraulic main, although I think he does not distinctly state whether this was the result of reasoned-out means to an end, or merely an accidental convenience. Anyhow the credit is due to him, and it is a distinction worth enjoying by any man. But I hope Mr. Watson will pardon me for observing, that in doing himself the justice of making these interesting circumstances known, he might, perhaps, have advantageously left the matter there.

When I was at school—I begin to wince when I think how long ago that is—a pinch was the means of admonishing one that what one was telling was "stale" news. Was this wholesome practice confined, I wonder, to our school? I think it must have been, or friend Watson was, fortunately for himself, beyond arm's length when reading his paper.

A thing may be new and not true, and it *may* also be true and not new. In reading the paper—and dismissing the hypothesis of its having been a good opportunity for the display of a little self-glorification, which is, of course, too absurd to be entertained for a moment—one cannot help wondering what it could have been written for. Surely Mr. Watson need not have taken the trouble to write and read a paper to tell the association that over-condensation affects the quality of the gas; and yet it seems puzzling to gather any other useful hint from it, unless it be the discovery of the application of the thermometer—another feather in his cap—nobody ever having dreamed of using such a thing for such a purpose before.

Ah, but "wait a wee," says our friend, in effect; "I have made a further important discovery, for while I effect the slow condensation of the gas in contact with the liquids in the pipe—*i.e.*, keep the gas and tar together as long as possible, consistent with the avoidance of an over-reduction of temperature, I do it in an entirely original manner. This I manage by cutting off such an amount of condensing power as to secure the required result." That is to say, I insert valves in the pipes, and thus cunningly contrive to prevent the gas flowing with the tar as long and as far as possible. As Dominie Sampson would have said, "Prodigious!" Then there is that battery condenser, which had (and presumedly still has) the paradoxical faculty, that "it did not take out the naphthaline, but led to its deposition in large quantities [in its own tar-boxes, instead of in the pipes], to the manifest injury of the gas, leading to the use of 8 or 10 per cent. of cannel." And, proceeds Mr. W., "I was led to believe that this arose from undue and rapid condensation [happy thought], and began to decrease it by stopping up the tubes, and eventually in cold weather, by passing the condenser altogether, and thus suiting the condensation to the make of gas. I have not had one stoppage in the works, nor have I had to remove a man-lid from a holder during the last two years, although these things were quite common previous to my becoming engineer of these works." Perhaps our Sydenham philosopher may be induced to read another paper next year. Who knows but that before then he may have been "led to believe" something else equally new and startling, say, that high heats make a larger volume of gas than low heats, or that hydrate of lime is a good purifying agent. May I have the temerity to respectfully inform Mr. W., notwithstanding that it rather interferes with the completeness and prettiness of this pæan, which it seems almost cruel to disturb, that he has been entirely misinformed as to these things being "quite common previous to my becoming engineer of these works?"

Respecting the other touching and equally veracious story about the manifest injury to the gas, and requiring the use of 8 or 10 per cent. of cannel, and so on, I regret that that inconvenient bugbear, truth, compels me to again play the iconoclast. "I remind me" that, through the courtesy of the directors of the company with which Mr. Watson is now connected, I have had the privilege, for a particular purpose, of publishing (with some others) a certificate, signed jointly by Mr. Ohren, the secretary, and Mr. W. himself, of the carbonizing results of seven consecutive half years (that particular period having been selected for the reason there given), during which time the coal and cannel used were respectively as follows:—

Common coal	81,785 tons.
Cannel	4,871 ,,
Making a total of . . .	86,656 tons.

It will be thus seen that for that period the proportion of cannel was barely 6 per cent., instead of either 8 or 10 per cent. But even this would be misleading without the explanation that the cannel, although it answered the purpose, was of an inferior description, costing, in fact, no more than the common Newcastle coals. In looking over my note-book, I find that, taking all the time I was with the company, the average proportion of cannel used was a trifle over 5 per cent. of the common coal. Let Mr. Watson correct me in this if I am in error. So much for "proportion" of statement.

Mr. Watson tells how "some five years ago this system [condensing in contact with the tar] was adopted at the Crystal Palace District Gas-Works, and a good sum of money was paid for the information, it being considered quite new at that time."

In this statement Mr. Watson is so far correct. It is true that some time previously a Mr. Thompson had offered for a small sum to put us in the way of getting rid of trouble with naphthaline, on the conditions, if I rightly recollect, of no cure no pay—an offer that was ultimately accepted by the directors—and it is equally true that I told both Thompson and the directors what I believed the remedy to be, and what it eventually proved to be. Whether the principle was new or unknown to the majority of gas managers I am unable to say, but I do not think it had been practically applied much before about that time; and I think, so far as I am concerned, that I first learned the *rationale* of the thing from one of Dr. Letheby's invaluable lectures to the association. At any rate, I knew nothing of it 14 years ago, and was therefore, in this respect, not so fortunate as Mr. Watson. I believe it was pretty generally believed that Mr. Thompson, who was, many years ago, foreman at the South Metropolitan Gas-Works, under the late Mr. Thomas Livesey, was the first to discover or observe the advantages, in respect of naphthaline, of cooling the gas with the tar, but which may have been a mistaken belief.

From the way the thing is put, one would be led to believe—an impression evidently intended to be conveyed—that the stopping up of the tubes of the condenser was an original idea of Mr. Watson's; but he must have known that the same thing was done each winter previously, and not only this, but that the outside horizontal pipes had also been protected in cold weather. This gentleman talks largely and learnedly about his improved (?) provisions for condensation, and about his "cutting off such an amount of condensing power as to secure the required result," and all the rest of it. Will he, in plain language, state what "cutting off" arrangements he has made at Sydenham, or if he has made any alterations at all? Mr. Watson found all the arrangements ready to his hand, including the means of either working through the whole of the vertical or battery condenser, through only the half of it, or of passing it altogether.

But our friend, not content with "delivering himself" of his dissertation on condensation and naphthaline, must needs travel out of the record by indulging in a congenial blast or two about the number of consumers, the annual make, the quantity of gas paid per ton of coal carbonized, (query, is the company paid for more now than formerly?) the perfect freedom of the gas from ammonia, (is this also new or attributable to anything Mr. W. has done?) and about the "sulphur compounds being under 20 grains per 100 feet, in accordance with the parliamentary obligations of my company," all questions having about as much concern with the ostensible subject of the paper as with the making of cream cheese. Touching this last evidence of his superior management, it seems a pity that Mr. Watson did not set himself right with the Lewisham Board of Works, who (as somewhat cruelly reported in the same JOURNAL containing the paper) had the audacity—doubtless through the erroneous results of Mr. Heisch's analysis of the gas—to prosecute "my company" for their gas containing only 49 grains of sulphur, instead of "under 20 grains per 100 feet."

The "application," as the persons say, of all this is, that there is, on the whole, a good deal to be said in favour of a little modesty. It

has the virtue of ever sitting gracefully, and of wearing well, and its acquisition we should all, at any rate, aim at attaining, even if we are not uniformly successful.

Gas-Works, Montreal, Aug. 25, 1874. E. S. CATHELS.

STORING GAS UNDER PRESSURE.

SIR,—In your JOURNAL of July 29, 1873, there is a paper on "Gas-holder Capacity compared with Consumption," by Mr. Jones, of Dover, in which that gentleman displays an elaborate amount of figures, but gives no hint or plan for remedying the existing evil.

To increase holder capacity by erecting new ones would, in many cases, be a source of trouble to the engineer, and a grievance to the consumer, as, to find the required dividends for the shareholders, the high price of gas has to be maintained.

As a rule, gas engineers are remarkably fond of high-pressure engines. I was told some time ago by an engineer that he never knew a gas engineer to study economy as regards his engines; the only reason he could give was, he supposed, there was plenty of coals in a gas-works.

Why not convert the present holders into high-pressure ones, that they may contain from 20 to 100 per cent. more gas if required? There is about a fourth of the year that gas engineers are troubled about holder capacity, and even that time it is merely a few hours out of each 24, so that in making new ones it would not do to construct heavy ones, or to weight them. To give you an ocular demonstration of my idea, you have merely to look at a purifier; the cover is a small gasholder on the high-pressure principle; it is held in its place by a few hooks, and at times, when it has the misfortune to blow, the hooks have to resist a great upward pressure, and it would make no difference, as regards pressure on the hooks, whether the cover was a few inches deep, or as many feet.

Now, what is the reason that this method cannot be put into practice with holders, either with hooks or a fancy girder, so that they should just catch the edge of the crown of the holder when the holders are full—that is, up to the hooks or girders—with the assistance of an auxiliary exhauster on the outlet of the purifiers, and a water-gauge on the inlet of the holder; or, if the company was poor, and had no spare engine and exhauster, the stops could be used so that when all the holders were full their pressure should be the same ratio; and in the summer time there would be no trouble and waste by the holder blowing, caused by expansion.

By this means of increasing holder capacity when required you would be able to work the retorts steady, not to overcharge them one part of the day and hold on the other; and if put into practice many men might be able to have the comfort of their Sunday. I quote the remark of Mr. Hunter, of Rochdale, from your JOURNAL of July 29, 1873, p. 682: "The men require it, and the laws of God demand it."

For an example, we will surmise that we have a telescope gasholder; the tank is 112 feet in diameter, the bottom of the holder 110 feet in diameter, and the top part 108 feet in diameter, with a 14-inch water-lock, the crown having a 7-feet rise and 12 columns. There would be then an area of 9503·34 square feet of water for the gas to press on, and the area of water outside the holder exposed to the atmosphere would be 348·71 square feet; the crown would be the portion of the convex surface of a sphere of 446 feet in diameter, giving an area for the gas to press upwards of 9808·07 square feet. Mark the columns when the holder is full. Just when it begins to blow, place the girders or stops so that the mark on the holder shall be an inch lower than the mark on the column; before the holder would blow again, the water inside the holder would lower 1 inch and rise outside 27 inches, which would not require a very strong extra wall to keep that body of water in, as a cubic foot of water is 1000 oz., or 62·5 lbs. After the stops or girders are fixed, allow the holder to rise, but not let it touch the girders. Looking at the water-gauge, we find it shows 5 inches of pressure. Now, 5 inches of water on the square inch is 26·66 lbs. on a square foot, so there would be a pressure on the crown of the holder of a trifle over 112 tons 14 cwt. 3 qrs. 7 lbs.; what pressure over that is an upward pressure on the girders. To increase the holder capacity 20 per cent., the gauge would show 6 inches, there would be a pressure of 23 tons 6 cwt. 3 qrs. 1 lb. extra on the crown of the holder and on the girders, or, in other words, an upward pressure on each of the 12 columns of 1 ton 18 cwt. 3 qrs. 16 lbs., or 12·84 lbs. on an inch of the circumference of the crown.

Some may raise objections such as these: "My tank is not very strong. If I put any upward pressure on my columns I might start my tank." Another may say, "If I was to use hooks the upward pressure might start the columns from their perpendicular, as my water-ways are so wide." There would be very little strain on the holding-down bolts until the upward pressure was more than the weight of the columns; the strain would be on the other fastenings of the columns, and it is a very poor column and girder that is not four tons, and you might charge the holder until there was an upward pressure of three tons on a column. The other objection would be very feasible, as the ends of the girders resting on the columns would be a greater distance from the holder than the middle, but that difficulty would be soon got over by having graduated stops on the edge of the holder, ogee shape, so that when the holder is up, each stop would touch the centre line of the girder.

CHAS. A. MACKENROT.

9, *Canal Grove, Old Kent Road, Jan. 15, 1874.*

[The insertion of this letter so long after its receipt requires some explanation. In another column will be found the address of M. Servier, who suggests high-pressure holders, and we have thought it only fair to a young English engineer to publish at the same time our correspondent's ideas on the same subject. To our mind, neither plan is feasible; but we submit both to the judgment of our readers.—ED. J.G.L.]

REGULATORS TO STREET-LAMPS.

SIR,—I shall be glad if any of your correspondents will inform me where the rheometers described in your issue of July 14 are to be obtained.

They seem to me very far superior to the leathern diaphragm regulator (of whatever maker) for average meter system of supply to public lamps.

Twelve months experience of 138 such regulators applied to the lamps of a rural company give the following unsatisfactory results, which may have some interest for your readers. Tested under 1 inch pressure, 19 only out of 138 were correct to the adjusted rate of consumption. The rest varied within limits as wide as 37 per cent. above, and 42 per cent. below the standard rate, as many as 23 being 25 per cent. above it.

Two of the regulators varied under different pressures, as under—

No. 1, at 9-10ths	pressure,	consumed	3·9 feet.
No. 1, at 7-10ths	,,	,,	3·3 ,,
No. 1, at 5-10ths	,,	,,	2·9 ,,
No. 2, at 7-10ths	,,	,,	3·2 ,,
No. 2, at 5-10ths	,,	,,	3·7 ,,

In round figures a reduction of 2-10ths in pressure altered the consumption half a foot per hour; so that allowing the meters to absorb 2-10ths of the pressure, then the consumption registered at a metered lamp will be half a foot under the average rate of the unmetered lamps.. I need hardly say this satisfies me of the necessity of some improvement in lamp regulation.

Ratcliff Gas Company, E., Sept. 11, 1874. HY. E. JONES.

P.S.—By-the-by, I notice, in a discussion lately carried on in your columns, it is assumed that Mr Sugg was the inventor of the lamp-regulators. I always understood that honour belonged to Mr. Paddon. I shall be glad of a correction if I am in error.

Miscellaneous News.

THE CORPORATION OF THE CITY OF LONDON AND THE GAS QUESTION.

REPORT OF THE GAS COMMITTEE.

CORRESPONDENCE RELATIVE TO THE TEST-BURNER.

Letter from the Town-Clerk to the Secretary of the Board of Trade (Railway Department).

Guildhall, E.C., March 21, 1872.

Sir,—I am directed by the Gas Committee of the Corporation of London to state to you that they have for a considerable time had under their serious consideration the results produced by the use of the test burner prescribed by the referees, and they can only, after careful examination, come to the conclusion that the "London" Argand Burner does not carry out the provisions of the Act of Parliament of 1868, inasmuch as it is quite unfit for general use, and educes from the gas an illuminating power far beyond that which can be obtained by the ordinary consumer.

The committee have been induced to come to this conclusion from the following facts, viz.:—

1. The burner is so near its smoking point that the slightest draught causes it to flare and smoke.

2. In a perfectly still atmosphere the smoke from this burner is far larger than from any other.

3. An increase of pressure of 0·03 of an inch (not one-tenth of that which is frequently occurring) will also cause it to flare much above the chimney.

4. Although it throws a very large quantity of light precisely at right angles to the flame, so as to take effect upon the photometer, it gives but little light in an oblique direction, and throws downward a large shadow.

5. The original cost and expense attending its use would preclude its adoption by the majority of consumers.

6. By the Act of 1868 an illuminating power of 16 candles is prescribed, but in consequence of the amount of illuminating power educed by the "London" burner, the consumer is supplied with a poorer gas than when the prescribed illuminating power was 14 candles.

The committee would again urge that the test-burner as prescribed by the referees does not carry out the intention of the Legislature, as it is not "practicable for use by the consumer," as provided by the 43rd section of the City of London Gas Act, 1868.

The committee are further of opinion that no burner requiring the use of a chimney would carry out the provision above referred to, but they would suggest that a bat's-wing or fishtail burner should be substituted, which would meet the requirement of the public and the provisions of the Act.

(Signed) F. WOODTHORPE.

Letter from the Board of Trade to the Town-Clerk.

Board of Trade (Railway Department), London, S.W., April 16, 1872.

Sir,—Referring to your letter of the 21st ult., I am directed by the Board of Trade to transmit to you herewith a copy of a letter from the gas referees (with its enclosure) on the subject of the test-burner prescribed by them under the provisions of section 43 of the City Gas Act, 1868.

(Signed) W. R. MALCOLM.

(ENCLOSURES.)

Board of Trade (Gas Referees Department), 21, John Street, Adelphi, London, W.C., April 11, 1872.

Sir,—The gas referees have the honour to acknowledge receipt of your letter of the 25th ult., forwarding a letter from the Gas Committee of the Corporation of London, repeating their objections to the standard Argand burner used in the testing-stations, and stating as their opinion that no Argand, nor indeed any burner requiring the use of a chimney, is "practicable for use by the consumer," and that therefore only bat's-wings or fishtails should be used as standard burners.

The gas referees cannot understand upon what grounds it is maintained that no Argand, or other burner requiring the use of a chimney, is practicable for use by the consumer. Such burners give the best and most agreeable light of any. It is also to be noted that an Argand was directly specified as the test-burner in the London Gas Act of 1860.

In regard to the objections taken by the Gas Committee to Sugg's Argand No. 1, the referees have simply to say that they cannot agree with them. The burner in question is very largely used in shops and also in private houses, and the referees have had ample opportunities of judging of it, and they regard it as a burner which perfectly fulfils the requirements of the Gas Acts of 1868 and 1869.

In conclusion, the referees have the honour to refer you to three previous letters of theirs on this subject, dated the 29th of January, 1869, July 24, 1869, and July 26, 1869, including the printed memorandum which they addressed to the Board of Trade, in compliance with a request to that effect from your predecessor, a copy of which is enclosed.

(Signed) T. FOSTER, *Secretary.*

W. R. Malcolm, Esq., Railway Department, Board of Trade.

(ENCLOSURE.)

To R. G. W. Herbert, Esq., Railway and Gas Department, Board of Trade.

Office of the Gas Referees. 23, New Street, Spring Gardens, July 24, 1869.

Sir,—The gas referees have much pleasure in expressing their opinions upon the memorandum which has been submitted to them on your behalf by Mr. Peel. That memorandum is as follows:—

1. "The Act of 1868 professes to give the public a better quality of gas—16-candle instead of 12 under the Act of 1860, and 14 for the present year.

2. "It is contended that this intention is practically nullified by the section of the Act of 1868 which prescribes the form of testing-burners; because, by

the improved test, the companies will actually be able to give exactly the same quality of gas as before, although it will be *nominally* two candles better.

"Is not this the case, and how is it to be explained?"

The object of the Act of 1868 is to obtain better terms for the public, but always under the condition that these terms do not conflict with the recognized rights of the companies. The Act proceeds on the principle that the companies are entitled to the maximum statutory dividend of 10 per cent., which all of them were paying at the time the Act was passed, or had been paying previous to the agitation on the question, which subjected them to enormous expenses of litigation. Accordingly, while the Act imposes upon the companies more onerous conditions as to price and illuminating power, these conditions are treated as tentative only, provision being made for their alteration in the event of their proving incompatible with the payment of a 10 per cent. dividend. For example, although clause 54 enacts that the price of gas should be lowered, clauses 57-70 provide for the raising of the price again, in the event of the terms of the Act being found too onerous—*i.e.*, incompatible with the acknowledged right of the companies to a 10 per cent. dividend.

Unquestionably, however, the Act *contemplated* a reduction of the *price* of gas; but it is not equally safe to affirm that the Act intended likewise to give the public gas of a *higher illuminating quality*. For, although it is enacted that the gas, when tested, shall, instead of 12-candle gas, be first 14 and ultimately 16-candle gas, it is previously enacted, by clause 43, that the burner used for testing shall be the best that can be procured for doing justice to the illuminating elements in the gas. In other words, while a higher illuminating power is required of the gas when tested, an improvement is simultaneously contemplated in the burner used in testing. These two provisions must be taken together. They are in no respect rival or counteracting clauses, like those above mentioned relating to the *price* of gas; and they must be read together in forming an opinion as to the intention of the Act as regards illuminating power. Hence it must be held in fixing the illuminating power of the gas as tested, the effect of the progress of science in the construction of burners was adequately taken into account by the framers of the Act of 1868.

There can be no question that but for clause 43, the companies would have objected much more strenuously against clauses 53 and 54.* It also seems manifest that clause 43, relating to the burner to be used in testing, was inserted by the framers of the Act in deference to the fact that no burner can possibly give more light than the gas intrinsically possesses, and that (provided the test-burner be one practicable for ordinary use) the companies may justly claim that the gas should be judged by its intrinsic quality and not through the medium of burners notoriously inadequate to develop the illuminating power contained in the gas.

Whether or not, then, the Act of 1868 "professes to give the public a better (illuminating) quality of gas," is a point upon which the referees do not feel justified in expressing an opinion, but they feel confident, upon the grounds above stated, that the Act cannot be construed as professing to give an improvement of this kind to the extent of four candles, as stated in the memorandum.

2. The second part of the statement in the memorandum is perfectly correct. Gas which was called 14-candle gas will now, by the use of the new burner, be actually 16-candle gas. This is its true quality. Accordingly, in order to meet the rise of four candles required by the Act between the years 1868 and 1870, the companies will have to use higher-priced coal only to the extent sufficient to give an increase of two candles in illuminating power. The effect of the new burner now invented, and adopted by the referees, in compliance with the Act, will be the same as if a discovery had been made, by means of which the companies can produce 16-candle gas at the same cost as 14-candle gas hitherto.

But, under the stringent financial restrictions of the Act of 1868, this economy of illuminating power will not in any material degree go as a gain to the gas companies.† As regards pecuniary profit, it is the public who will be chiefly benefited, by a further reduction of price. For example—

Take the case of a company which can supply gas of the illuminating power required by the Act judged by the test-burner formerly in use, and yet pay the statutory dividend of 10 per cent. In consequence of the adoption of the new test-burner, the company will be able to supply gas of the required quality at a less cost than before; they will save 5d. per 1000 feet of gas. But this saving will not remain with the company; for the company (having already reached their highest allowed dividend) will have to devote the sum thus saved to the reduction of the price of their gas, so that the gain will be immediately transferred to the consumers.

Or, take the case of a company which cannot supply gas of the required illuminating power, save by a reduction of its dividend below the allowed 10 per cent., such a company will at once, under clause 57 of the Act, apply for the appointment of commissioners, whose duty it is (if satisfied that the company carries on its operations with adequate economy) to allow the company an increase of price sufficient to permit of its paying a 10 per cent. dividend. A rise in the price of gas must follow; but the adoption of the new test-burner will have the effect of diminishing this rise of price to the extent of 5d. (the estimated cost of 2 candles light in gas).

Every gas company included, or to be included, under the conditions of the Act of 1868 must fall under the one or the other of these cases; and in both cases the effect of the adoption of the new burner is substantially the same—namely, a gain to the public as regards the *price* of gas—in the one case by producing a reduction in the price; in the other, lessening the rise of price provided for by the Act in the case of companies which cannot pay 10 per cent. while supplying gas of the illuminating power fixed by the Act.

In brief, the *pecuniary effect* of the adoption of the new burner is this: it will benefit the public by producing a certain and permanent reduction of price, to the extent of 5d. per 1000 feet of gas, which is the value of 2-candle light.

The referees may add that not only this, but every economy or saving on the part of the companies, must, under the Act of 1868, go to the public, either as a reduction of price or as a relief against a rise of price; for (1) the dividends of the companies being fixed at 10 per cent. (a rate of profit which nearly all of them are already paying), every gain beyond this must go to a reduction of price; and (2) as a company which cannot pay 10 per cent. is entitled (under clause 68) to a rise of price, or to a diminution of illuminating power, adequate to yield them the full dividend, everything which facilitates the acquisition by the companies of the full dividend facilitates *pari passu* a reduction of price to the public.

As regards *illuminating power*, there is no advantage to the public from the adoption of this new burner. By using the new burner, the public will get the fullest amount of light prescribed in the Act, while at the same time getting a reduction of price; but as regards the great majority of persons, who doubtless will long adhere to the burners they have previously been using, they would actually get less light than before, were it not for the increase of illuminating power required by the Act. With a rise of illuminating power from 12 to 14 candles, those persons who adhere to the old burners will get only the same light as before; with a rise of 4 candles (*i.e.*, from 12 to 16 candles), they will get an increase of 2 candles. But under all circumstances they will receive the value of 2 candles in a reduction of price.

Such, in the opinion of the referees, is a full and fair statement of the effects of the adoption of the new test-burner. All persons who choose to provide themselves with the improved burners, will get the fullest amount of light prescribed in the Act, and also, directly, or indirectly a reduction of price to the value of 2 candles light; those who continue to use the old burners will get less light by 2 candles than the Act puts within their reach, but they will get the value of the 2 candles in a reduction of price.

The referees must add that the adoption of the new burner, or rather of one of equal illuminating power, might have taken place irrespective of clause 43 in the Act of 1868; for such a burner may be constructed in a form fully complying with the vague and valueless specification of the test-burner given in clause 25 of the Act of 1860—namely, an Argand with 15 holes and a 7-inch chimney. The new burner has 24 holes and a 6-inch chimney. But the number of holes and the height of the chimney are matters of comparatively little importance; for, by increasing the size of the holes and widening the chimney (as well as by the adoption of an apparatus at the bottom, regulating the supply of air), the same conditions for high illuminating power may be attained as exist in the new burner. The grand principle of construction in good Argand burners, is a low pressure (or no pressure) of gas at the point of ignition, and such a draught up the chimney, or supply of air to the flame as will consume the gas in the manner best fitted to give out fully its illuminating power. If too much air is thrown upon and mingles with the gas, the gas is too rapidly consumed, and the light reduced; if too little, a portion of the gas is imperfectly consumed, and the flame smokes.

The referees are happy to know from your memorandum, which Mr. Peel allowed them to see, that the Board of Trade fully approve their adoption of the improved burner for testing purposes, a matter, indeed, in which the Act left the referees no option, seeing that the new burner is as fully practicable for ordinary use as the previous test-burner, and at the same time is cheaper. If the referees had done otherwise, the companies, whenever a fine was imposed upon them for defective illuminating power, would have pointed to the existence of this better burner as a proof that the referees had contravened the provisions of the Act. Moreover, as already said, that even if clause 43 had been omitted from the Act of 1868, a burner of as good illuminating power as the new one could have been adopted under the Act of 1860; and, judging from what actually took place in 1860, such a course would, doubtless, then have been followed, if such a burner had been in existence.

In fact, the adoption for testing purposes of the best burner for doing justice to the illuminating quality of the gas, although now made imperative, is only what has been done on previous occasions. The same course was followed when the Act of 1860 came into operation. On that occasion a new burner (the Sugg-Letheby) was adopted as the test—a burner as much superior to any then in use as the new burner (Sugg's "London") adopted by the referees now.

Moreover, two important points of difference must be noted between that case and the present one. In the first place, under the Act of 1860, the pecuniary effect of the adoption of an improved burner for testing purposes went wholly as a gain to the companies; whereas now, owing to the more careful provisions of the Act of 1868, the pecuniary gain (as above shown) will go to the public. The second point of difference is, that in 1860 the change in the standard of illuminating power was allowed to pass *sub silentio*—the public knew nothing of it; whereas, when making a similar change now, the referees (who considered the whole bearings of the case carefully and minutely) felt the full importance of the matter, and while adopting the new burner for testing purposes (as by the Act they were compelled to do), they challenged the attention of the public to the change in their report of May 5, to which the Board of Trade gave wide and authoritative circulation by laying it before Parliament. Nor did the referees content themselves with simply announcing the change, for they at the same time took the opportunity to bring under the notice of the public the enormous waste of gas and the increased charges which the public laid upon themselves from the use of defective burners, placing the case in the clearest light by statistics showing alike the illuminating quality of the various kinds of burners in common use, and also the price of each of the best kinds of burners. As this is a matter of the highest practical importance, involving an immense economy to the public, the referees are glad to see that their report (thanks to the publicity given to it by the Board of Trade) has largely attracted the notice of the public press, nearly all the London daily newspapers, besides others, having devoted leading articles to its contents. And the referees trust that the facts which they thus brought into notice will ere long work a revolution in the gas lighting of the kingdom, which will confer a gain upon the community to an extent which must appear incredible to any one not conversant with the subject. As the gas-rental of London alone amounts to upwards of £2,000,000 a year, it will be seen at once what a vast gain is derivable from the use of better burners, either in reduced gas bills, or, as will more likely be the case, in obtaining a greater amount of light from the same quantity and quality of gas.

While thus, in response to your memorandum, expressing their opinion as to the purport and character of the Act of 1868, with special reference to its provisions in regard to price and illuminating power, the referees beg to say, in conclusion, that they are strongly of opinion that, in fixing the illuminating power, by far the best course is to specify in the Act a particular kind of burner as the one to be employed as the standard. This is the only certain way of proceeding. The fixing of the illuminating power in gas Acts is really a financial and not a scientific question. It is simply a pecuniary condition imposed upon the companies, and it is impossible to estimate the true nature of this condition unless the starting-point of the computation be correctly known and permanently maintained. The Act of 1868 did not do this, neither did the previous Act of 1860; but as other gas Acts may be expected ere long, the referees hope that their expression of opinion upon this matter will not be deemed unseasonable or uncalled for.

(Signed) T. FOSTER, Secretary.

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* Even with this proviso in favour of the company, as well as the provision for insuring justice by a revision of prices, Parliament this year (whether rightly or wrongly) considered that the terms of the Act of 1868 are too onerous, and have relaxed them in favour of the two companies now about to be brought under some of the provisions of this Act.

† The extent to which the companies may be benefited by this economy of illuminating power is as follows:—First, in the case of a company which can comply with the requirements of the Act, and at the same time have a surplus of profits above 10 per cent.; in this case, a small portion of this surplus will go to the formation of an insurance-fund, the remainder being given to the public in a reduction of price. Secondly, in the case of a company which, by means of the new burner, can pay a 10 per cent. dividend under the Act, but without which it could not do so; for it may be expected that the commissioners appointed under clause 57 will require unusually strong evidence of economy, &c., on the part of a company, before they allow it to raise its prices above those named in the Act.

Report of Mr. Charles Heisch on the Letter of the Gas Referees to the Gas Committee of the Corporation of the City of London.

8, *Savage Gardens, April* 29, 1872.

Gentlemen,—As the letter from the gas referees to the Board of Trade, of April 11, makes no attempt to answer any one of the six reasons given by you for considering that the "London" burner does not comply with the Act of 1868 in being practicable for use by the consumer, and does not disprove, or even contradict, one of the facts on which those reasons are founded, your letter of March 21 remains practically unanswered, the bare assertion that the referees cannot agree with it being no reply to a statement of facts, the accuracy of which you are prepared to prove. It is true that in the Act of 1860 an

Argand burner was specified as a testing-burner, but an attempt was made to define that burner, so as to secure to the consumer a uniform quality of gas under a given name. The definition was so bad that this object was not attained, and in 1868 all attempt at definition was given up, and the possibility of the test-burner being from time to time changed was first admitted, but guarded by the proviso, then for the first time inserted, that in all cases the burner should "be practicable for use by the consumer." The statement, therefore, that the "London" Argand is as practicable for use as the Sugg-Letheby, even if true, which I by no means admit, has nothing to do with the question, as the clause requiring the test-burner to "be practicable for use by the consumer" did not exist in the Act of 1860. The question really resolves into this, Who is the consumer?

As I stated in my report of June 27, 1871, it cannot be taken to mean "an individual who can secure exceptional circumstances, and to whom cost is no object," but must mean the "majority of consumers," who (in the City especially) do not occupy private houses, but draughty shops, warehouses, cellars, &c. Those who pay for the lighting of the streets are also fully entitled to be considered consumers.

Though some few exceptional shops may use Argand burners, it is notorious that in most places where they were formerly used they have been abandoned as expensive, wasteful, and giving out great heat. Many churches and public buildings—for example, Exeter Hall—which formerly used Argands, are now lighted with flat-flame burners, with much saving and better effect.

A simple inspection of the ceilings and walls of any of the testing-stations, which are furnished with the "London" Argand, every burner having its own governor, so as to diminish the risk of smoking, will show how unfit, even at its best, that burner is for general use; the ceilings, and about three feet down the walls, being coated with soot after a few months use.

With respect to the enclosures, I may remark that No. 1 (letter of gas referees in reply to a memorandum of Mr. Peel, and dated July 24, 1869) seems clearly to show that the referees have entirely mistaken their true functions by acting as if all their regulations were to be framed with a view to ensuring a 10 per cent. dividend to the companies. The very fact that power is given to the company to apply for a revision of price, if they can prove that they cannot fulfil that which is required of them, shows that the referees are to be guided only by the simple words of the Act, and to let the companies look after their own dividends. The question, therefore, really hinges on whether it be a fact or not that the "London" Argand fulfils the conditions of clause 43 of the Act. While the first part of the clause has been most fully carried out, I believe that the second, and to the consumers the most important, has been overlooked, as, while fully giving the referees credit for honestly believing that the burner is practicable for use by "the consumer," in their sense of that word, I must maintain that their sense is far too restricted to reach the requirements of the bulk of consumers.

The statement that it is doubtful if it were intended by the Act of 1868 to give gas of a higher illuminating power will certainly not be endorsed by any one conversant with the proceedings of the committee on the bill, which were all based on the declaration that the interests of the consumer had not been sufficiently studied in the Act of 1860, and that the quality of the gas ought to be improved. It was also repeatedly stated that the public lighting was to be put on the same footing as that of the most favoured consumer, which makes it clear that the committee never contemplated that, by the introduction of a new test-burner, the public streets might be no better, or even worse, lighted than before the passing of the Act. No one even asserts that the "London" Argand, or any burner giving in the photometer a light to be compared with it, can be used in the street-lamps.

Whatever, therefore, may have been the views with which the companies assented to the clauses 53 and 54, it may be confidently asserted that, had the corporation or the committee who passed the bill been told that under the Act a test-burner could be employed which would produce the result above-named, clause 43 would have been so modified as to render it impossible.

While differing strongly from the referees, both as to their real functions and also as to the burner being in accordance with the Act of Parliament, it is very satisfactory to note that, though they conceive themselves bound by the Act to prescribe the "London" burner, they are not satisfied with the condition of things which renders this possible, and insist on the necessity of the burner being defined in future gas Acts, so that a definite article may be given at a definite price.

In the enclosure No. 2 (letter of referees in answer to memorandum of Mr. Hughes, dated Jan. 24, 1869), there is but one passage to which it is necessary to call your attention—viz: "It will not do to test the gas by a burner of costly or intricate construction, seeing that the public cannot afford, or may not be able to use, such burners, and, in consequence, while an illuminating power of 14 or 16 candles might be obtained and recorded in the testing-places, if fitted up with the superior burners, the public at large, using a common kind of burner, would not really get the amount of light *obviously contemplated by the Act*.

In the face of this admission the referees prescribe a burner costing at its lowest 5s., which cannot be used without a governor, which will not bear the slightest draught, and which entails a constant expense for new chimneys and new cones.

(Signed) CHARLES HEISCH.

Gas Referees Office, 21, *John Street, Adelphi, London, S.W., June* 20, 1872.

Sir,—The gas referees beg to acknowledge receipt of your letter of May 31 and enclosures, forwarded to them by the Board of Trade.

The referees have to state that they have not found any reasons for changing the standard burner adopted by them in 1868, but in deference to Mr. Heisch's repeated objections, they will make a searching investigation as to the results of the employment of that burner in shops and under other circumstances of general use.

(Signed) T. FOSTER, Secretary.

F. Woodthorpe, Esq., Town-Clerk, Guildhall.

Letter from the Town-Clerk to the Board of Trade.

Guildhall, E.C., March 20, 1873.

Sir,—On the 21st of March last I was directed by the Gas Committee of the Court of Common Council to address a letter to you upon the subject of the test-burner then in use by direction of the gas referees at the several stations for testing the gas supplied to the citizens of London, in which I called your attention to the conclusion at which the committee had arrived after a careful examination of the question—viz., that the "London" Argand burner does not carry out the provisions of the Act of Parliament of 1868, inasmuch as it is quite unfit for general uses, and educes from the gas an illuminating power far beyond that which can be obtained by the ordinary consumer.

I, at the same time, recited the several reasons which had induced the committee to arrive at this conclusion.

I further stated that the committee were of opinion that no burner requiring the use of a chimney would carry out the provision sec. 43 of the City of London Gas Act, 1868, "that the test-burner should be practicable for use by the consumer," and that a bat's-wing or fishtail burner should be substituted, and which would meet the requirements of the public and the provisions of the Act.

In reply I received a communication from you, transmitting a copy of a letter from the gas referees on the subject of the test-burner prescribed by them under the provisions of section 43 of the City Gas Act, 1868, with an enclosure addressed to Mr. Herbert, in reply to a memorandum of Mr. Peel.

In reply to this communication I forwarded to the Board of Trade a report of Mr. Charles Heisch upon the subject, and I would further observe that in their letter the gas referees state that "they cannot understand upon what grounds it is maintained that no Argand or other burner requiring the use of a chimney is practicable for use by the consumer." To the several objections raised by the committee the gas referees do not attempt to give any answer, but simply state that they cannot agree with them.

They further state that the burner in question (Sugg's "London") is very largely used in shops and also in private houses. As this assertion is not justified by any returns, and is quite in opposition to the experience of the committee, they think that, upon an investigation of the facts of the case, it will be found that, although in some few exceptional instances Argand burners are used in shops, in most places where they were formerly used they have been abandoned as expensive, wasteful, and giving out great heat. Many churches and public buildings (for example, Exeter Hall) which formerly used Argands, are now lighted with flat-flame burners.

On the 20th of June, 1872, I received a letter from the gas referees, in which they say that, in deference to Mr. Heisch's repeated objections, they will make a searching investigation as to the employment of the burner in shops and under other circumstances of general use.

There can be no doubt but that in passing the Act of 1868 the Legislature contemplated that there would be some considerable difficulty in settling the question of the test-burner to be used, as all attempt at definition was given up, and the possibility of the test-burner being from time to time changed was first admitted, but at the same time guarded with the proviso, that in all cases the burner should be practicable for use by the consumer.

In the enclosure sent with your letter of April 11, 1872, the gas referees admit that gas which was called 14-candle gas, will now, by the use of the new burner, be actually 16-candle gas. But this is evidently fallacious if the test-burner which educes the quality of light is not available for the general consumer, and hardly so in a few exceptional cases.

The committee would therefore suggest that it should be referred to the gas referees to inquire into the whole circumstances of the case, with a view to ascertaining whether some other burner should not be prescribed by them, which will fulfil the requirements of the Act, and not, as the present test-burner, represent an illuminating power which can only in very rare and exceptional cases be obtained by the consumer. Indeed, the necessity of this was admitted by the late referees in their letter of June 20, 1872, referred to above, and written previously to their leaving office.

The Gaslight and Coke Company having applied for a revision of the scale of price and of illuminating power of the gas supplied by them, it becomes the more important and essential that the burner by which the gas is tested should be practicable for use by the consumer in the true and extended sense of the term, it being a well-ascertained fact that the lower the quality of the gas the greater is the difference in the light educed from it by the London burner and that educed by any burner which can actually be used by the general consumer.

(Signed) F. WOODTHORPE.

W. R. Malcolm, Esq., Board of Trade.

Board of Trade (*Railway Department*), *London, S.W., July* 29, 1874.

Sir,—With reference to your communication of the 9th inst., on the subject of the test-burner prescribed by the gas referees under the section 43 of the City of London Gas Act, 1868, I am directed by the Board of Trade to transmit to you herewith a copy of a communication from the gas referees on the subject.

(Signed) HENRY G. CALCRAFT.

John B. Monckton, Esq., Guildhall.

(ENCLOSURE.)

17, *Buckingham Street, Adelphi, W.C., July* 25, 1874.

Sir,—We have to acknowledge the receipt of Mr. Malcolm's letter of the 16th of July, enclosing copy of a communication from the town-clerk of the City, on the subject of the test-burner, dated the 9th of July.

It happens that the latter-named communication crossed one of ours to the town-clerk, dated the 7th of July, of which we enclose a copy, and which answers his communication.

You will recollect that our predecessors, at an early period, adopted as the test-burner an Argand improved by Mr. Sugg, which showed a higher illuminating power with a given gas than that formerly used.

The City authorities were much displeased with this measure, and have remonstrated repeatedly against it. The late referees in consequence of their importunity, promised shortly before they left office to undertake a full investigation on the subject, and the City authorities wish to require of us the fulfilment of this promise.

We are quite prepared to undertake any investigations that come properly within our duty, but in this case the only question that requires consideration is whether the burner complies with the provision of the Act, that it shall be "practicable for use by the consumer."

We have accordingly adopted two methods of determining this—first, by trying the burner for some time in ordinary household use under our own observation; and, secondly, by inquiring to what extent it is used by the public in general.

Each of us has now had the burner in use for many months, and we find its action satisfactory and unobjectionable.

We are also informed by Mr. Sugg that the sale of it to the public is very large, and is still increasing.

We believe, therefore, we are justified in deciding that the burner does comply with the provision laid down.

We do not think it necessary to answer in detail all the remarks and objections made by the City in regard to the burner, as we believe them to have arisen, in a great measure, from a mistaken view of what the Act requires.

(Signed) WILLIAM POLE,
(Signed) A. G. VERNON HARCOURT,
Two of the Gas Referees.

The Assistant Secretary, Railway Department, Board of Trade.

QUEENSTOWN WATER-WORKS COMPANY.—The half-yearly meeting was held on the 7th inst.—Mr. Cahill in the chair. The directors report stated that, although the season so far had been unusually dry, the consumers had been fairly supplied. The boiler and engine at the works had recently had a thorough overhauling, and had been put in good working order. A cargo of steam coals had been imported and stored at the works. A dividend at the rate of 5 per cent. per annum (free of income-tax) was recommended, payable on and after Oct. 1. The report was adopted, and the retiring directors re-appointed.

ACCRINGTON GAS COMPANY AND THE LOCAL BOARD.—At the monthly meeting of the Accrington Local Board, on Monday, Sept. 7, a letter was read from Mr. Swain Rhodes, chairman of the gas company, tendering his resignation as chairman of the board. Mr. Robert Hargreaves, cotton manufacturer, was appointed. The gas company had refused to tender for gas for the street-lamps unless certain conditions were complied with, one of which affected the late inspector, William Boothman, and a resolution was passed to discharge him. A memorial was read, signed by the most influential manufacturers, praying the board to consider the desirability of purchasing the gas and water works for the town.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Annual Meeting of this Company was held on the 9th inst.—Alderman HEDLEY in the chair.

The SECRETARY (Mr. W. Hardie) read the following report of the directors:—

The directors submit their report and accounts for the year ending June 30, 1874. The accounts are made out in the form required by the Gas Companies Clauses Act, 1871. The receipts are £129,186 9s. 7d., and the expenses £106,938 2s.; leaving a balance of £22,248 7s. 7d. to meet dividends and interest on loans. The increased charges for gas produced £19,287 16s. 8d.; but owing to a falling off in the receipts for coke and other products, the actual increase in receipts over last year is only £13,659 17s. The expenses are £7312 0s. 7d. over those of last year, the greater part of which arises on coals.

In March last, the directors paid an intermediate dividend of 2½ per cent. for the half year ending Dec. 31. They now propose that a similar dividend be declared for the half year ending June 30, making 5 per cent. for the whole year.

In 1873 some coals purchased for delivery in that year were not delivered, and the directors bought other coals in place of them at high rates. The difference in price was recovered from the contractors and carried to the suspense account, and the directors propose that this sum £1831 18s. 8d., together with £418 1s. 4d. of the unappropriated profits for the same year, be divided amongst the proprietors.

Although coals are still beyond the prices they stood at previously to the late great rise, the directors—basing their calculations on the probability of favourable results during the present year—propose to reduce the price of gas within the boroughs to the old rate of 3s. 4d. per 1000 cubic feet, less 4d. per 1000 cubic feet discount for prompt payment, with a proportionate reduction on the price charged outside the boroughs.

During the year 9¼ miles of pipes have been laid in renewals and extensions; 100 new lamps have been erected, and upwards of 1000 additional service-pipes and meters have been fixed.

The new works at Redheugh are in progress, and are expected to be in operation in the autumn of next year. The expenditure there necessitates the raising of additional funds, and the directors propose for this purpose to ask the authority of the shareholders to borrow £25,000 upon debenture, under the powers of the Act of 1867.

Owing to the greatly increased duties of the secretary, consequent on the erection of new works at Redheugh and the general extension of the business of the company, the directors feel that the time has arrived to consider the propriety of increasing his salary.

The board are glad to bear testimony to the zeal and discretion displayed by Mr. Hardie in the interests of the company, and they recommend that his salary be increased from £400 to £500 per annum, and that a gratuity of £100 be presented to him for past services. Under the Companies Clauses Consolidation Act, sec. 91, the remuneration of the secretary must be fixed at a general meeting of the company.

A resolution will be submitted authorizing the directors to change the day for holding the annual meeting from September to the preceding month of August.

The directors—Mr. W. Brown, Mr. T. Hedley, Mr. B. Plummer, Mr. J. Douglas, Mr. J. B. Alexander, Mr. T. L. Gregson, Dr. T. Humble, Mr. R. Atkinson, and Mr. W. B. Wilkinson—retire, but offer themselves for re-election.

The directors lament the death of one of the auditors, Mr. R. White, and another auditor will have to be appointed in his place. The remaining auditor, Mr. J. H. Richardson, retires, but offers himself for re-election. Any proprietor is eligible for the office of auditor.

The CHAIRMAN, in moving the adoption of the report, said he had very great pleasure in congratulating the shareholders on the improved prospect of the company, as compared with last year. This improvement was caused by the considerable fall in the price of coal. Two years ago 26s. a ton was the price of coals, and twelve months ago the price fell to 17s. 6d. a ton, but this year the directors had been able to get contracts at rather under 10s. a ton. At the commencement of the last financial year the directors entered into contracts for coal at an average price of 17s. 6d. per ton in order to supply a portion of their requirements, and calculations which were then made showed that if the price of gas was increased 6d. per 1000 feet, they would be enabled to pay a dividend of 5 per cent.; and that advance of sixpence had realized £15,200. The net profits, according to the accounts, amounted to £20,165, after paying interest on loans and debentures. If they had not been able to advance the price of gas 6d. per 1000, the profits of the year would have been under £5000; and the result would have been that the directors could not have paid a dividend of more than 1 or 1½ per cent. to the sharenolders. The Act of Parliament which was obtained, although not all they could have wished, had acted favourably to them, and secured to the shareholders a dividend of 5 per cent.; and it empowered the directors, whatever the price of coal was, to pay a full dividend of 7 per cent. when the price of gas was lowered to the old rate of 3s. per 1000 feet. In 1872 contracts for coal were entered into at low prices; but the prices went up to something like 24s. per ton. Some of the contractors failed to deliver coal during the year ending June 30, 1873; and the directors had to purchase coal at a very high price; but they had succeeded in recovering from those contractors the difference between the contract price, and what had to be paid in making other purchases; and with this money they would be able to pay 1½ per cent. to the shareholders, on account of the dividend that was unpaid for the year ending June 30, 1873. The dividend paid on the 7 per cent. stock in June, 1873, was £4 7s. 6d., instead of 7 per cent., which they were allowed to pay; and this dividend of £1 10s. would raise the amount to £5 17s. 6d., leaving a balance of £1 2s. 6d. The low prices at which they had been able to effect contracts for coal for their requirements during the present year enabled the directors to recommend that the price of gas be reduced to 3s. 4d. per 1000 feet; and with that price the directors had reason to believe the company would, next year, pay at least 5 per cent. dividend; and, if everything went on favourably, and the price of coal came a little further down, they would, he hoped, be able to make up the back dividend. The works at Redheugh were going on satisfactorily. They had some little difficulties, but they hoped to overcome them all, and have a portion of the works completed by the time required. To show the necessity for increasing the plant of the company, he quoted the following figures:—During the year ending June 30, 1865, the company made 442 million cubic feet of gas; in 1872 they made 659 million feet; and in the last year the quantity increased to 749 million cubic feet, which was nearly double the quantity made nine years ago. The amount received for gas in 1865 was £41,924; in 1872, £67,829; and last year, including the advance of 6d. in the price, the amount was £100,029, or two-and-a-half times as much as was received nine years ago. In 1868 the company paid £15,642 for coal, the average cost for the year being 6s. 5½d. per ton; in 1872, £22,831, or an average of 6s. 7½d. per ton; and last year the amount was £68,296, or an average price of 17s. 1d. per ton. Some of their outside friends said the company should not have increased the price of gas at all; but if they would point out how a dividend could have been paid without increasing the price, when they had to pay £68,000 against £22,000 for coal, they would teach him what he was not equal to seeing himself. To meet the cost of increasing the works it was necessary to take authority from this meeting to borrow £25,000 on debentures. He was glad to say that during the past year the works had been conducted in a manner very satisfactory to the directors. They had had no difficulty with the workmen, and altogether they were very well satisfied with the way the works had been conducted. They had entered into engagements with some of their best retort-men, with whom they had had the greatest difficulty in former years, to serve the company during the winter; therefore the directors looked forward to getting over the winter without any difficulties. From the statistics which he had given they would judge that the duties of the secretary had been very much increased; and it was intended to submit a resolution increasing his salary from £400 to £500 a year, and also to give him a gratuity of £100 for past services. Since Mr. Hardie became secretary, the duties had increased something like four times what they were, and the revenue paid in dividend had risen from a little above £5000 to £22,000. He concluded by moving the following resolution:—"That the report of the directors be approved and adopted; that a dividend be declared of 2½ per cent. for the half year ending the 30th of June last, which, with the intermediate dividend of 2½ per cent. paid in February last, completes the statutory dividend for the year; also that the sum of £4831 18s. 8d., recovered by the company for unfulfilled contracts in the year ending the 30th of June, 1873, with an addition of £418 1s. 4d. from the undivided profits of the same year, be divided amongst the proprietors in part payment of the deficient dividend of that year, which amounts to 1½ per cent. upon the 7 per cent. consolidated stock; and that such dividend of 1½ per cent. be accordingly declared."

Alderman PLUMMER seconded the resolution, which was unanimously agreed to.

The CHAIRMAN then moved a resolution authorizing the directors to borrow a sum not exceeding £25,000, which, with £50,000 authorized to be borrowed at the meeting in 1865, makes £75,000.

Mr. J. B. ALEXANDER seconded the resolution, which was agreed to.

The CHAIRMAN moved that the salary of the secretary be increased from £400 to £500 per annum, commencing from the 1st of July last, and that a gratuity of £100 be presented to the secretary for his past services.

Alderman PLUMMER seconded the resolution, and it was unanimously agreed to.

The SECRETARY appropriately acknowledged his obligations for this substantial proof of the satisfaction of the proprietors.

The retiring directors having been re-elected,

Mr. W. COCHRANE CARR said that the figures mentioned by the chairman showed that the work of the directors had increased, whilst there had been no addition to their fees; and he, therefore, moved that the allowance to the directors be increased from £658 to £1000 a year, and he thought that that was even too small a sum.

Mr. J. S. CHALLONER seconded the resolution.

Alderman GREGSON said he was very glad to see so generous a spirit among the shareholders, but he thought if they made the remuneration too much they would make the office one to be coveted for the sake of the emolument, and not for the services to be rendered. He thought that the directors, with the exception of the chairman, were well enough paid for their services.

The CHAIRMAN did not agree with Alderman Gregson. There had been a considerable increase in the duties of the directors, and he did not think any company was more economically or more carefully managed than this company. The remuneration paid to the directors of gas companies in London, similar to this company, was from £1500 to £2000 a year. Some of the directors thought they should have a little more than they now had. Alderman Gregson had no wife or children, and did not require anything more, and perhaps he would be content with what he had, and let the others take the increase.

Mr. J. ANGUS said he would cordially support the motion, but he thought, as the matter had come as a surprise to the shareholders, that the consideration of the motion should be deferred until their next meeting.

The CHAIRMAN said the directors did not know that such a motion was going to be proposed, and none of the directors were desirous for the increase, unless it was the unanimous wish of the meeting.

Mr. B. LUPTON spoke in favour of the motion.

Alderman PLUMMER said he had no idea that such a motion was going to be proposed, and one or two gentlemen having expressed a wish that its consideration should be postponed until the next meeting, he hoped Mr. Carr would withdraw the motion.

The CHAIRMAN, after further discussion, said the directors wished Mr. Carr to withdraw his motion, and it would come up at a future time.

Mr. CARR withdrew his resolution, and in its stead proposed that the directors be paid £500 additional for their past services, and that the question of making the increase permanent be considered at the next meeting.

Mr. J. S. CHALLONER seconded the resolution.

Mr. JOHN WILKINSON thought the increase should not be made without due notice, and he therefore moved as an amendment that the subject be taken into consideration at the next meeting.

Mr. W. H. STEPHENS seconded the amendment, which was put and carried.

Mr. J. H. Richardson was re-elected auditor, and Mr. R. Y. Green was elected auditor in the place of the late Mr. Robert White.

On the motion of the CHAIRMAN, seconded by Alderman PLUMMER, it was resolved to hold the annual meeting in August instead of September in future.

A vote of thanks having been passed to the chairman, the meeting terminated.

HULL GAS SUPPLY.—An influential deputation of the inhabitants waited upon the mayor at the town-hall on the 9th inst., with the view of having a meeting in the Sessions Court, to consider the price of gas in the old town. The deputation was introduced by Councillor Field, and Councillor Elam stated that it was desired to have the meeting on the 14th inst., at eight p.m. The mayor said that he considered the application partook essentially of a public nature, since it might be preferable that corporations should eventually undertake the management of the gas and water supply. He therefore acceded to the request. The borough of Hull is supplied by three companies; the town, however, has always been districted, consequently they have no dead capital or duplicate mains. The old company, established in 1824 as an oil gas company, supply the town within the area of the old walls, now an island, with a population of under 18,000. The farthest point of distribution is not more than 700 yards from the works, but most of the principal shops are in this district; the price charged for gas is 4s. 6d. per 1000 feet. The Drypool Company have a scattered population of about 20,000, in a poor district, the chief consumption being oil-mills and shipbuilding works; the price charged by them for gas is 4s. The British Gas Company have a population of about 90,000, which is rapidly increasing; the price of gas in their district is 2s. 6d. per 1000 feet. All the gas supplied in Hull is common gas, with an illuminating power of, say, 15 or 16 candles, by Sugg's 15-hole elliptical burner.

DUNDEE GAS COMMISSION.—At the meeting of the commission on the 2nd inst., it was stated that Mr. M'Crae, according to instructions, had made inquiries as to Malam's process of gas manufacture in operation at Dumfries, and had received the following information from a gentleman who had had an opportunity of testing the apparatus:—"After testing and inspecting Mr. Malam's process at Dumfries, my impression is that it will not do. We tested 10 cwt. Newcastle coal—got 6200 cubic feet of gas; average illuminating power, 10·8 candles. As near as we could ascertain from the books, there seems to have been used at Dumfries for the period from June 1, 1873, to May 31, 1874, about 2800 tons of coals, fully the half of which was Auchlochan. The make of gas in round numbers was 31 millions. The leakage from the data we got was not less than 28 per cent., and yet the mains are said to be in first-rate condition and size." Mr. M'Crae added:—"From the foregoing extract it will be seen that gas at the rate of 12,400 cubic feet was taken from the coal, of an illuminating power of 10·8 candles. The same coal in the ordinary process of gas-making produces 10,000 cubic feet of 14 candles, while by comparison the latter gives light represented by 14,000, the former by 13,392. It will also be observed that the total coal used and the total gas made at Dumfries last year gives an average yield per ton of 11,071 cubic feet, of which 28 per cent. was unaccounted for—by condensation, leakage, &c., or by erroneous measurement at the station-meter." The committee did not think it necessary to take any further action in the matter in the meantime. Mr. William Thomson approved of the conduct of the committee in the matter. It was quite clear, he thought, that if a greater quantity of gas was taken from the coal than by the ordinary process, the illuminating power would be correspondingly reduced.

FALMOUTH GAS COMPANY.

The Annual Meeting of Shareholders was held at the Town-Hall, Falmouth, on Friday the 4th inst.—Mr. R. M. TWEEDY presiding.

The following report of the directors, which had been previously circulated, was taken as read:—

During the past year several alterations and improvements have been made in the works, including the rebuilding of a large portion of the retort-house and arches, and the erection of a new scrubber and steam-pump, the latter for the purpose of utilizing the ammoniacal liquor which was formerly wasted, but is now a source of revenue.

The continued high price of iron has caused the postponement of the relaying of mains and services, except where it was considered absolutely necessary; but this portion of the property will be carefully inspected during the present year.

The very unsettled state of the coal market, and the difficulty of obtaining an offer for a supply of coal to be delivered as required during the next six or nine months, has prevented the earlier announcement of a reduction in the price of gas. This having now been arranged, it is proposed to reduce the price of gas to 5s. 10d. per 1000 feet from the 29th of September next.

The amount of profit realized last year appears large in comparison with that of former years. Some portion of the increase may be explained by the following circumstances, viz:—Coal was purchased on better terms than was anticipated when the last rise in the price of gas was determined on, therefore the profit on the gas supplied is unusually heavy. The receipts for tar last year are also probably about £150 more than may be expected in future, in consequence of there having been a demand for this article, and the stock which was on hand, and considered almost valueless, has been disposed of. The receipts from these two sources, which in future we cannot expect will be so heavy, account for a large portion of the increase of profit.

From the balance of £1062 7s. 1d. your directors recommend the payment of a dividend, for the year, at the rate of £6 5s. per cent. (free of income-tax), which will amount to £672 16s. 3d., and the transfer of £350 to the new works account, leaving £39 10s. 10d. to be carried forward.

Messrs. R. M. Tweedy, W. H. Thomas, and W. Slade Olver, three of your directors, retire by rotation, but offer themselves for re-election. The auditors, Messrs. Wm. Phillips and W. H. Williams, retire, but offer themselves for re-election.

The CHAIRMAN, in moving the adoption of the report, said it was very gratifying to the directors to be able to present such a statement. They had gone on improving from year to year, and this year their position was such as to offer a dividend of 6¼ per cent. Several alterations and improvements have been made during the past year, but the principal work has been the rebuilding of a large portion of the retort-house. The continued high price of iron has caused the postponement of the relaying of mains and services, except where it was considered to be absolutely necessary, but it is a question whether the deferring of this matter is to be justified, because the leakages of this year have certainly not been less, but rather more than former years. A large portion of these leakages is no doubt caused by the imperfect service-pipes of some of the private consumers, the pipes in some cases being carried a long distance through the gardens. But this matter will receive the attention of the directors. The increase of the cost of gas to private consumers which was raised in June, 1873, will be reduced to 5s. 10d. per 1000 feet from the 29th of September next, but during the year the quantity of gas used has been 800,000 feet less than last year. This falling off may be accounted for from the high price of gas, the consumers being much more careful, in not burning longer than is strictly necessary. But with the public lamps he did not think a decrease was required. Strangers when visiting Falmouth complained of the darkness of the place, calling it "Western Darkness." Especially in the parish, the light was far from what it ought to be, and he hoped those who had the management of the parish affairs would look into this matter, for he felt sure—speaking as a ratepayer—that the ratepayers would not grudge to pay a little more for light.

Mr. R. R. BROAD seconded the adoption of the report. The shareholders generally were well satisfied with the present state of affairs, and an increased dividend was surely a step in the right direction. The management being in the hands of so able a chairman and his co-directors, their interests as shareholders could not be otherwise than carefully attended to.

The motion having been carried,

The CHAIRMAN moved that a dividend of 6¼ per cent. be declared, that £350 be transferred to the new works account, and that the balance be carried forward.

Mr. R. C. RICHARDS seconded the motion, which was put, and agreed to.

The retiring directors were re-elected.

The CHAIRMAN, in acknowledging the compliment paid to him by his re-election, said it was now a gratification to be a director of such a company. They had gone on increasing their dividends and improving their works, so that now they believed their works to be as good as any, and before long the model works of the country; but to this successful end they are much indebted to their active and energetic manager, without whose assistance and suggestions the directors could not have carried out the work they had done. They were extremely fortunate in getting such a manager, and the directors hoped he will remain with them for many years yet to come.

The auditors having been reappointed,

The CHAIRMAN made a few observations as to the action of the Assessment Committee in fixing on £400 as the gross annual value, and £340 as the rateable value of their property, the directors considered this so unfair that at the next quarter sessions they intended to appeal, and Mr. Rogers, of Helston, was now busily engaged in preparing the case.

Votes of thanks were passed to the manager (Mr. F. M. Harris), and the secretary (Mr. R. J. Lukey), the former for his intelligent assistance, and the latter for his attention to his duties, and careful manner in which he kept his books, the chairman stating that not a single error had been made since Mr. Lukey had been their secretary. The meeting then terminated.

GAS EXPLOSION AT LIVERPOOL.—On the morning of Sunday, Sept. 6, a gas explosion, attended with a fatal result, occurred at a public-house at the corner of Stanhope Street and Grafton Street, Toxteth Park. It appears that the inmates of the house went to bed about two o'clock on Sunday morning, when everything was supposed to be right. Between eight and nine o'clock, however, when Mrs. Nelson went downstairs, she at once discovered a very strong smell of gas, and, without delay, she informed her husband of the fact. He at once got out of bed also, went downstairs, and, on getting to the bar portion of the premises, he struck a match to find out the place from which the gas was escaping. No sooner had the match been ignited than there was an explosion. Mr. Nelson was knocked down, and his clothing almost instantaneously caught fire. Upon hearing the noise of the explosion, Mrs. Nelson rushed into the parlour, and threw a bucketful of water over her husband, and extinguished the flames. A neighbour had meanwhile obtained admission to the house, and before the lapse of many minutes he succeeded in stripping the shreds of burned clothes from Mr. Nelson. The gas was shortly afterwards shut off at the meter by another neighbour, thus preventing further danger. The unfortunate sufferer was removed to the Royal Southern Hospital, where it was found that he had been terribly scorched all over the body. Dr. Robinson, one of the house surgeons, attended to him with the greatest care and promptitude, but the poor fellow died from the effects of his injuries between three and four o'clock in the afternoon of the same day. As a result of the explosion, one of the walls of the parlour was thrown down, and several plate-glass windows in the bar were completely smashed. Mrs. Nelson states that there had been an escape of gas in the room for some time, but several attempts to find out the place from whence it proceeded proved unavailing. The servant put out the lights after she had cleaned the bar on Saturday night, and at that time she perceived no smell. It was customary to keep a light burning in the bar, and, therefore, the gas was not shut off at the meter.

SUNDERLAND GAS COMPANY.

The Annual Meeting of Shareholders was held on the 1st inst.—Mr. E. C. ROBSON in the chair.

The following report of the directors was presented:—

The shareholders of the Sunderland Gas Company will receive herewith the balance-sheets of the company, which have been duly examined and certified by the auditors.

In addition to the interim dividend paid in March last, your directors recommend the declaration of a further dividend of 5 per cent. on the original stock, and of 4¼ per cent. on the additional capital stock of the company, payable on the 15th day of September, making a total of 10 per cent. on the original capital, and of 8½ per cent. on the additional capital stock of the company for the year.

The lamented decease of the late Mr. Alderman Lindsay has caused a vacancy at the board, which has been filled up by the election of James Laing, Esq.

The directors have much pleasure in intimating to the public that the recent decrease in the price of coals will enable them to make a corresponding reduction in the price of gas; and they therefore propose to allow a discount of 6d. per 1000 cubic feet for prompt payment within the month, on all gas which may be consumed after the commencement of next quarter.

The directors who retire by rotation are Messrs. James Hills, James Stokoe, Henry Taylor, and Jas. Laing, who, being all eligible for re-election, offer themselves accordingly.

The CHAIRMAN said it was always a pleasure to the directors to meet the shareholders when there did not exist, as at their last annual meeting, any uncertainty as to their ability to pay a maximum amount of dividend. The shareholders would recollect that last year the directors met them under very exceptional circumstances, the price of coal having risen to so high a rate as to seriously jeopardize the chance of maintaining the statutory dividend of 10 per cent.; but this doubt had now been removed. Anxious to lay the whole of the circumstances before them, and to treat them with the candour one partner should treat another, he told them at the last annual meeting that the price of coal was so high that unless they could recoup themselves to a considerable extent by the sale of coke, tar, and ammonia, they could not maintain the very handsome dividend which they had enjoyed for several years. However, he was glad to say that the prices obtained for these articles fully realized their expectations. They would see that the large sum of £12,300 was obtained for this residuum during the past year, against £9959 in the preceding year, which was also a year in which coal was high in price; and if they looked at the accounts for the year preceding the last year he had alluded to, they would find the amount under this head was only £5026. Owing to the prices which they had obtained for the products he had mentioned, they had been able to weather the storm of high prices without damage, being able to declare a dividend of 10 per cent., besides paying back £180 of a sum of £600 which they borrowed from the reserve-fund of £6000 last year, to enable them to pay the maximum dividend. They would see that not only had they been able to maintain their dividend—which was a very satisfactory thing—but they were able to make a very handsome reduction in the price of gas to their customers. They had not only enabled the corporation to enter into a contract which would save the town £1000 on the lighting of the public lamps, but they were able to offer to sell gas from the 1st of October at a reduction of 6d. per 1000 feet. Alluding to the hardships under which gas companies labour, he said, whatever the price of coal, the company were unable to charge more than 4s. per 1000 feet for the gas supplied by them. If all gas companies were as anxious to do their duty as the Sunderland Company were, he was sure there would be no need for so much absurd and "grandmotherly legislation." He trusted the handsome reduction of 6d. per 1000 feet would be a substantial benefit to the town, and give that impetus to the consumption of their gas which it had lost; for, though the amount derivable from gas-rents (£44,904) showed an increase of £5000 on the year, there had not been an increase in the actual quantity of gas made, which was not owing to the high price, but to the stoppage of certain large works which consumed much gas. They would observe a larger amount had been paid for repairs than last year; but this expenditure was unavoidable. He had great satisfaction in informing them that their works were in a most excellent state of efficiency. Several improvements had been made, particularly at the Ayres Quay Works, which, being earlier constructed, were not so perfect as the Hendon Works. He believed that, if they acted with common prudence and kept clear of accident, they might look forward to the continuance of the dividend in the future, and his only regret was that, having purchased their shares at high premiums, to a number of the shareholders the dividend would only really be 6 or 7 per cent. He alluded to the death of Alderman Lindsay in appropriate terms, and said the directors had filled up the vacancy in the directorate by the appointment of Mr. James Laing, whose election he was sure every one would approve, his knowledge of business and high character rendering him acceptable to everybody. He concluded by moving the adoption of the report.

The motion having been adopted,

Mr. RICHARDSON moved—"That a dividend of 5 per cent. be declared on the original stock, and 4¼ on the additional stock of the company, for the half year ending June 13, payable on the 15th inst."

Mr. DAVISON seconded the motion, and it was carried unanimously.

Messrs. Hills, Stokoe, Taylor, and Laing were re-elected directors. Mr. H. G. Armstrong was re-elected auditor. It was agreed that the remuneration of the auditors should be increased from 15 to 20 guineas each.

A vote of thanks to the chairman concluded the business of the meeting.

CHESTERFIELD WATER-WORKS AND GASLIGHT COMPANY.—The first yearly general meeting of this company was held on the 27th ult., when the report and accounts were presented and unanimously adopted, and a dividend at the statutory rate of 7 per cent. per annum was declared, payable on the 1st of October next. Mr. Wilkinson (the gas analyst of the Corporations of Sheffield and Rotherham) reported the average illuminating power of the five examinations made by him to be (when corrected to sperm candles consuming 120 grains per hour; an Argand burner—Sugg's—with 15 holes, consuming 5 cubic feet of gas per hour; barometric pressure 30 inches, and temperature of gas 60° Fahr.) 18·70 candles. He also reported the quantity of sulphur in 100 cubic feet 10·3 grains. Quantity of ammonia in 100 cubic feet, 2·6 grains. Average of two tests. No sulphuretted hydrogen was detected during the time of testing, but a slight discoloration of the test-paper had taken place after an exposure of 36 hours at the station-meter.

WIDNES GAS AND WATER WORKS.—The "Summary of Receipts and Payments" made by the Widnes Local Board, under the "Widnes Improvement Act, 1867," for the year ended March 31 last, with respect to their gas and water undertakings, shows the following results. The receipts for gas, meter-rents, fittings, and products amounted to £9043; deposits, £98; meters and repairs, £49; coal (including £600 for breach of contract), £634; loans, £2000; miscellaneous receipts, £155; total, £11,979. The payments (including a balance from previous account of £926) amounted to £14,830, made up of the following items:—Coals, £4601; purifying materials, £52; gas manufacturing, £998; rent, £209; salaries, £308; legal expenses, £740; repairs and lighting lamps, £136; retort renewals, £289; retort extensions, £267; building extensions, £842; mains and services, £504; rates and taxes, £111; interest on loans, £1102; loans repaid, £2300; deposits repaid, £49; bank interest, £166; fittings, £262; tools, £80; machinery, £145; lamps, £72; meters, £313; repairs, £240; miscellaneous items, £118; leaving a balance against the board of £2851. On the water account the receipts (including a balance from previous year of £1397, loans £3000, and payment from general district fund £2000) were £13,668, the water-rates, meter-rents, and fittings amounting to £7082. The payments (including interest on loans £3009, and loans repaid £3543) amounted to £13,516, leaving a balance in favour of the account of £152.

QUEENSTOWN GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held on the 7th inst.—Capt. CURRY in the chair.

The SECRETARY (Mr. Gibson) read the following report of the directors:—

The directors have much pleasure in stating that many improvements have lately been carried out, by increasing in diameter the principal main-pipes, building a coke-store, obtaining additional land adjoining the works, erecting a new scrubber and an exhauster, &c., all of which were necessary, and at no distant date will prove remunerative.

The accounts for the past half year are annexed, and a dividend at the rate of 6 per cent. per annum recommended, payable on and after the 1st of October next. More capital will shortly be required, and the directors have under consideration how best to recommend how it should be raised, whether by additional, ordinary, or 5 per cent. preference shares, and when the time arrives for raising additional capital it is clearly to be agreed on that such new capital shall be placed for distribution amongst the old shareholders, in the proportion of shares held by them.

Balance-Sheet, June 30, 1874.

Dr.		*Cr.*	
Permanent investment to Dec. 31, 1873	£12,108 13 8	Share capital	£7,000 0 0
Extensions to June 30, 1874	136 17 6	Mortgage debentures	5,000 0 0
Rental	649 12 3	Directors and auditors	22 9 0
Public lamps	203 2 7	Debentures holders interest	123 19 2
Stock of coals	248 9 10	Unclaimed debenture interest	12 6 11
Stock of coke and tar	112 14 0	Sundry creditors	964 3 5
Stock of pipes, meters, &c.	451 6 1	Bank	85 13 7
Sundry debtors	48 4 3	Unrepresented cheques	8 16 8
		Profit and loss	741 11 5
	£13,959 0 2		£13,959 0 2

The CHAIRMAN, in moving the adoption of the report, alluded to the great loss the company had sustained in the death of their late chairman, Capt. Newman.

Mr. HAYES seconded the motion.

Mr. CAHILL, as chairman of the Water Committee, endorsed everything that had fallen from Capt. Curry, for both companies had sustained a great loss by the death of so excellent a chairman as Capt. Newman.

Mr. ALCOCK alluded to the absence of an engineer's report.

The CHAIRMAN said they would have that supplied the next time. He thought they had reason to congratulate themselves upon having so successfully passed through the coal famine. The directors took pains to economize in every way, and they had now a large stock of coals on hand. He might mention that after paying their dividend they were only £20 worse off than they were that day twelve months.

In reply to Mr. Fry, the CHAIRMAN said they had a stock of about 800 tons of coal on hands.

After some further discussion, the dividend, as recommended, was agreed to and the retiring directors, Messrs. Seymour and Garfit, were re-elected, as were also the auditors, Messrs. Penrose and Madden.

The proceedings then terminated.

DARLINGTON CORPORATION GAS SUPPLY.

At the Meeting of the Town Council of Darlington, on the 3rd inst., the Town Clerk read the following minute of the Gas-Works Committee, passed at a meeting held the same day:—

Price of Gas.

The committee have taken into consideration the balance-sheet for the past half year, and under all the circumstances it cannot recommend any reduction in the price of gas at present.

Mr. LUCK wished to remind the committee that at Stockton the gas had been reduced. He moved the adoption of the report.

Mr. FRY seconded the motion.

Mr. POTTS said he had seen in the newspapers that the price of gas had been reduced at Stockton, and he should like to know if there was any assignable reason why it should not be as cheap at Darlington as at Stockton.

Mr. FRY stated that the reason was the great leakage. It was 14 per cent. the last half year, 23 per cent. this, and 21 per cent. in the corresponding half of last year. The manager had gone fully into the matter, and he attributed the increase to the large pressure he had been obliged to use in consequence of the small pipes. It would cause a difference of something like £800. When the main was laid on the other side of the Skerne the leakage would be reduced to its normal state.

In answer to Mr. Watson, Mr. FOGGITT stated that the leakage was not much larger than it was at Middlesborough. With regard to Stockton gas, the light was only 13 candles, while that of Darlington was 16.

Mr. POTTS said the leakage was preventible, and he hoped the committee would pay attention to it.

Mr. H. PEASE: It is preventible to a certain extent, but it has always been a difficulty.

The MAYOR: 15 per cent. is a fair leakage, but everybody knows that in forcing gas through too small pipes it is much increased.

The report was adopted.

GAS EXPLOSION AT BODMIN.—On Friday, Sept. 4, an explosion took place in the house of a gentleman named Jacobs, who had but that day taken possession of the premises. A smell of gas had been noticed in one of the parlours, but it was not thought sufficient to do any harm. On returning to the house at night, the smell had increased, and Mr. Jacobs went to the meter and turned the gas off. He then went into the parlour and opened the window and door, thinking the gas had all escaped, as the strong smell was gone. He then took a light to see where the gas had escaped; he went to the chandelier, and on lifting the light to examine it an explosion took place. Fifteen panes of glass were blown out, and the window-blind set fire to. Mr. Jacobs was very much burnt about the hands, face, and head, besides being much frightened. A want of water in the pendant seems to have been the cause of the escape of gas.

GAS EXPLOSION AT WALSALL.—About midnight on Friday, the 4th inst., Police-constables Hickman and Howells, of the Walsall Police Force, received information of an escape of gas in a house and shop in Stafford Street, Walsall, lately in the occupation of Mr. Edmunds, grocer, but now empty. Lifting the sash of a back window, they got into the house, and putting the windows open, went into the different rooms with a lighted candle in quest of the place of escape. On reaching the back parlour they noticed that the pendent had been removed, the connecting-pipe being left unplugged; and to satisfy themselves that this was the place from which the gas was coming, Hickman got upon a barrel in the room, and was just raising his light towards the ceiling, when an explosion occurred, which hurled him and his fellow-officer backwards, and burnt their heads, faces, and hands severely, in addition to doing damage to the premises. Hickman contrived to grope his way out of the house, and closed the window, when he missed his companion, and on returning found him lying on the top of the cellar steps. He assisted him out of the window, but whilst he was doing so his lamp fell out of his hand, causing a second explosion, which did as much damage to the men and the house as did the first. They were conveyed to the Cottage Hospital, in a cab which happened to be passing at the time, and Hickman was detained as an in-patient. Howells was allowed to go to his lodgings. Afterwards Sergeant Childs went to the premises, just in time to prevent a third explosion, the gas in the front room being alight, and the escape in the back room being still in progress. He at once turned off the supply at the meter and opened the doors and windows, thus precluding the possibility of further accident.

KEIGHLEY GAS SUPPLY.

The Monthly Meeting of the Keighley Local Board, to whom the gas-works supplying the district belong, was held on Tuesday, Sept. 1—Mr. ALDERSLEY in the chair.

At the commencement of the proceedings the CHAIRMAN alluded to the recent "indignation meeting," held to protest against the advance made by the local board in the salary of the gas manager. While admitting that the ratepayers had a perfect right to meet and discuss matters when they had a grievance to redress, he thought that those who undertook the conduct of such meetings should take care to be well informed as to the statements they made. The impression created by the speeches made at that meeting was that the Board of Health rates amounted to 6s. in the pound, whereas they were only 2s. He denied the charge made against the board of reckless expenditure, and expressed his opinion that they had rather been penurious than otherwise. In respect to the salaries of their servants, he thought that the members of the board ought to be credited with sense and honesty of purpose enough to know what was being done, and how they were spending the money of the ratepayers; and for his part he did not think that any of them were too highly paid or inefficient in the discharge of their duty. He did not know what these people who were complaining wanted—probably they did not know themselves.

Mr. WALL thought that the meeting in the Working Men's Hall could scarcely be called a ratepayers meeting, or a representative one, as it had not been properly called, and he considered the board could easily stand against anything that had been advanced.

Mr. CLOUGH asked whether a 2s. rate lasted for the whole year.

The RATE COLLECTOR stated that last year only one rate of 2s. was laid.

Mr. HARDWICK thought that all that had been said about the ratepayers meeting, though he had nothing to do with it, was quite uncalled for. He held the same views that he did previously about the salaries of their officers being too high, both in relation to the work to be done and the means they had at their disposal.

The Gas Committee presented the following financial statement for the year ending June 30 last:—

Capital Account.

Dr.			*Cr.*		
Expenditure to June 30, 1873	£41,992	12 2½	Loans, at 4 per cent	£1,000	0 0
Since that date—			Do. 4½ „	6,050	0 0
Land	625	0 0	Do. 4¾ „	7,060	0 0
New buildings, works, and apparatus	419	13 5½	Consumers deposits	26	9 0
New mains and service-pipes (not being in place of old ones), and other work connected with distribution	940	10 0	Accumulated profit to June 30, 1872	28,344	1 3½
New lamps, including erecting	85	16 8½	Last year's profits	1,641	15 3
Parliamentary expenses (Provisional Order)	52	11 9			
Balance	6	1 5			
	£44,122	5 6½		£44,122	5 6½

Revenue Account.

Manufacture of gas—			Gas and meter rent	£11,185	16 3
Coals, including carriage	£8,125	15 5	Gas for public lamps	800	0 0
Purifying materials and labour	225	12 11	Coke	2,518	6 6
Wages of stokers and yard-men	1,063	0 11	Gas lime	28	9 4½
Oil, tallow, ashes, leading, &c.	91	8 11	Tar and ammoniacal liquor	665	15 5
Maintenance and repairs of works and plant, including renewals to retorts, &c.	195	0 0½	Meters	94	3 3
Distribution of gas—			Cottage rents	19	8 0
Wages to meter inspectors	133	10 5½			
Renewals and repairs to mains & service-pipes, &c.	55	5 10½			
Public lamps—					
Lighting, cleaning, and repairing	214	6 3			
Establishment—					
Rent, rates, and taxes	199	6 6			
Salaries to superintendent, clerks, & collector, printing, and stationery, and general office expenses	456	12 5			
Balance carried to profit and loss account	4,551	19 6			
	£15,311	19 2½		£15,311	19 2½

Fire Brigade Account.

Balance, June 30, 1873	£1,032	6 10	Ten per cent. depreciation (see profit and loss account)	£114	0 0
Expenditure this year (on stock)	114	15 0	Balance	1,033	1 10
	£1,147	1 10		£1,147	1 10

Profit and Loss Account.

Interest on loans, consumers deposits, and bank account	£816	15 2	Balance of profits from revenue account	£4,551	19 6
Fire brigade, wages, and repair	102	7 11½			
Fire brigade, depreciation of stock	114	0 0			
Balance, being net profits for the year	3,518	16 4½			
	£4,551	19 6		£4,551	19 6

General Summary.

Balance at credit of capital account	£6	1 5	Balance at debit of fire brigade account	£1,033	1 10
Balance at credit of profit and loss account	3,518	16 4½	Cash in hand	26	11 8
Banker's account, amount owing	3,765	7 7	Coals in stock	128	0 0
Tradesmen's accounts for coals, &c.	818	5 10	Tar, liquor, and gas lime in stock	30	5 0
Interest due to loanholders	116	0 0	Oxide of iron in stock	60	0 0
			Consumers meters in stock	109	8 0
			Amount due for coke, tar, liquor, &c.	989	5 7½
			Amount due for gas, including gas used in lamps	5,847	19 1
	£8,224	11 2½		£8,224	11 2½

The Gas Committee recommended that a reserve-fund should be formed to meet extra expenditure and contingencies, and that an amount equal to 2½ per cent. of the capital be appropriated out of this year's profits to that fund, and that the price of gas be reduced from 4s. 2d. to 4s. per 1000 cubic feet, the discounts remaining as previously fixed.

Mr. BRIGG, in moving the adoption of the recommendation of the committee, said it might be as well to state the views of the committee with respect to the proposals now made. In the first place, it was due to the board to explain how the profit upon the year was larger than was anticipated. Last year, as would be remembered, the committee submitted a statement of the position of the works, and an estimate of the expense of carrying on the works, and that estimate had proved considerably under the amount realized. There were several reasons for that state of matters, which was not to be regretted. At the

beginning of the year the whole of the coal was not bought, as it was then exceedingly dear. They could not afford to be without coal during the winter, however, and only part of the contracts had been let; and, as had been anticipated by some of the committee, coal came down, and what was purchased after was got at a much lower figure. Then there was another reason, namely, that though coal had come down coke did not fall much, and they had been selling it at an exceedingly high rate. Then there was the gradual increase in the consumption of gas, which had been going on during the year at an average much greater than before. The real, or perhaps the greater reason, however, was that more gas had been sold per ton from the coal. In the previous year the quantity was 7500 cubic feet per ton, while this year it had been 8531—over 1000 feet per ton more, which made a considerable difference in the profit. The next point was—in what way would they deal with that profit? The committee proposed that a reserve-fund should be formed. Hitherto they had kept their accounts according to the schedule of the Gas Clauses Act, though they were not under that Act, and as they had hitherto made no provision for extraordinary renewals or contingencies, these had been taken out of the revenue, so that one year there might be no profit at all, and in another there might be £2000 or £3000. The committee, therefore, proposed to form a reserve-fund from the profits to meet contingent renewals of an expensive character; and he would remind the board that next year they would have to begin to pay off the amount of money which had been borrowed for the works, and would have to form a sinking-fund, which could be easily done out of the reserve-fund, which it was proposed should be allowed to accumulate to one-tenth of the capital. He was quite well aware that there was always a tendency to reduce the price of gas, and that there was a certain amount of popularity to be derived by those who came forward to make such a proposal. He thought he would be able to show, however, that it was not so much in the interest of the ratepayers to do so. He believed that the plan they had hitherto followed was due to the late Mr. Hird, who gave great attention to the subject, and who laid down some principles upon which they had acted. That gentleman held that so long as they sold the gas at a fair and reasonable price the gas consumer had no reason to complain, and the profits might be employed in reduction of the burdens of the general ratepayers. The capital of the gas-works was £44,000; that was the sum that had been spent in them, and only £14,000 of that sum had been raised on loans, so that there was not more than one-third of the capital on which they paid interest. The interest of the £14,000 would be about £630; but if they had borrowed money to do the extra works, and had paid interest at, say, 4½ per cent. on the whole £44,000, there would be £1300 of profit lost every year; whereas to-day they were saving interest on £30,000. They were committed to a large expenditure in their new works, part of which would be got from the railway company, part from loan, and part would have to be paid out of the accumulated profits of the business. It was sometimes said that it was not fair to use the profits of the gas-works for water-works purposes; but for some years the profits would be required for gas purposes; and if they were agreed upon the proposal to form a reserve-fund, the next question was what was a fair sum to pay for the gas. Last year, in anticipation of the price of coal, the price was raised to 4s. 2d., on the distinct understanding that if the price of coal fell the price of gas would be reduced. It seemed to the committee, looking at the price paid in other towns, that 4s. per 1000 cubic feet would be a fair and reasonable rate, and they proposed that the price should be reduced to that sum. They also proposed that no change should take place in the scale of discounts. When these were revised last year the maximum discount was reduced from 25 per cent. to 20, and previously a consumer had to burn £125 worth of gas before he could claim that; now he had to burn £170 worth before he could claim the 20 per cent., and the committee wished to keep the revised discounts. He believed that in the possession of such a valuable property as the gas-works, when other towns had to pay, and would have to pay, large sums to acquire such works, they were in a most fortunate position. They had a water supply, and a scheme for a further supply in an advanced state; the public lamps were only charged the cost price of the gas, and the works were charged with the maintenance of the fire brigade. He believed that if these burdens were not upon the business it would pay from 12 to 15 per cent. The town was to be congratulated on the possession of the works, and might justly be proud of their position; and he thought that the financial statement which had been read fully dispelled any charges of mismanagement either by the committee or by the superintendent.

In answer to Mr. Hardwick, Mr. BRIGG said that when he said that if the Gas Committee were paid fully for the lamps and for the fire brigade, there would be a profit of from 12 to 15 per cent., allowance was made for interest on the whole of the debt.

Mr. HARDWICK thought that there was too great a difference between the highest and the lowest discounts allowed on the gas accounts. Four shillings to the large consumers and sixpence to the small appeared to him to be much too great a difference. He did not want to lose any of the consumers, because he believed it was their advantage to keep both the small and the large ones, and he thought that the committee had gone in the right direction when they reduced the discount.

Mr. WALL said that in a large concern like a mill there was a good deal of leakage, and the discount ought to be larger.

Mr. CLOUGH pointed out that if it was not for the large consumers the small ones could not be supplied at the rate they were, while if the large ones were charged a higher rate than now they might make their gas, as they could easily do, at their own works.

Mr. FIELDHOUSE wished to be informed what the leakage of which Mr. Wall had spoken consisted. He could not understand one person getting a pound's worth of gas for 16s., and another having to pay 19s. 6d. for it. He contended that the fire brigade was kept up for the benefit of the large consumers. [Mr. BRIGG: No.] That the dirt of the town was made by the large consumers, and that it cost the ratepayers 4s. out of the pound for gas to clean after them. He did not see why, when at York gas could be supplied for 3s. per 1000, they should pay 4s. at Keighley. He saw no use for a reserve-fund.

Mr. BRIGG said that the gas consumer had a perfect right to say as Mr. Fieldhouse had said, "You are charging a large profit, and devoting it to other things than gas, and you have no right to make me pay what the ratepayers generally ought to pay." If he (Mr. Brigg) had said that he might have been open to the imputation of selfishness, as he was in that class. But that was not the view he had taken, for if they reduced the price of gas, they would relieve the large consumers at the expense of the ratepayers. He denied that the fire brigade was kept up for the large consumers, for the whole town was equally interested in it. The number of fires in small places was much in excess of those in large ones; and even suppose it was the reverse, who suffered? All the people employed suffered. A good deal had been said about gas being supplied cheaper in other places. As a set-off against this statement he might mention one case. In Barnsley, where gas ought to be made cheaply, where the Keighley Gas-Works got nearly all their coal from, and where coal or which they paid 15s. a ton was delivered in the Barnsley works for 5s., the price for gas was over 4s. per 1000 feet. He pointed out that under the old discount there were only four consumers who could claim 25 per cent.; and he believed that that number had been reduced by the raising of the sum upon which it was paid from £125 to £170. The gas, at 20 per cent. discount, was equal to 3s. 2½d. per 1000 feet, and the cost of production was only 2s. 5d., so that there was still a profit.

Mr. CLOUGH said that about ten years ago their firm decided to take gas from the town. They had made gas for 30 years previously, and knew that they could make it cheaper than the town was charging. If the town was making, or could make, 10 or 12 per cent. on gas, what was to hinder a private firm to make it cheaper than the price they were charged?

Mr. BEDFORD explained that one of the reasons why a manufacturer could make gas cheaper than the board could supply him for, was that stokers who attended to the engines could in addition make the gas. One of the reasons which induced manufacturers to take the town's gas in preference to making for themselves, was that they preferred not to have gas apparatus on their premises because there was considerably less risk by taking the town's gas.

Mr. FIELDHOUSE then moved, as an amendment—"That a competent person be engaged to inquire into the value of the gas plant, and to furnish the board with the extra cost which was required to produce gas to the large consumers."

Mr. BRIGG said the only use that Mr. Fieldhouse's proposition could be would be to get the gas plant valued; but what use would there be in paying £50 or £100 to value a plant which they were about to destroy. They would, as soon as possible, be removing the plant to the new works. It would be all very well, after that was done, to have the plant valued.

Mr. FIELDHOUSE understood that they were going to spend about £70,000 at the new works.

Mr. BRIGG said he had never heard that sum named. They did not intend to spend half that sum.

The CHAIRMAN said the question appeared to him to be one of what was fair to pay as between the small and the large consumers, and he did not see who else than an average taker could satisfactorily settle that question.

Mr. LAYCOCK said that in the cost of 2s. 5d. per 1000 feet was included the interest on the £14,000.

The amendment was not seconded, and, on the motion being put, it was carried with one dissentient.

INSTITUTION OF CIVIL ENGINEERS.

The Council of this Institution have issued a list of subjects upon which they invite communications for the session 1874-75. Among these are the following:—

"On the Flow of Fluids and Gases."

"On Portable Apparatus for Gauging the Materials, and for the Expeditious Mixing of large Quantities, of Portland Cement Concrete."

"On the Value and Strength of the different Materials used for making Concrete: comparing, for example, Portland Cement with Hydraulic Lime, Shingle with Iron Slag or Quarry Rubbish, coarse River with fine Sea Sand, together with Experiments on the Proper Proportions of each, and of the Water, whether salt or fresh, to produce the Strongest Mixture."

"On the Constant Service of Water Supply, with special reference to its introduction into the Metropolis, in substitution for the Intermittent System; and on the Waste of Water, and the best Apparatus for its Prevention."

"On the various Modes of Dealing with Sewage, either for its Disposal or its Utilization."

"On the relative Cost of the Conveyance of Coal by Rail and by Steamer."

"On the various descriptions of Pumps employed for Raising Water or Sewage, and their relative Efficiency."

"On the Employment of Water as a Motive Power, its relative Advantages and Disadvantages compared with Steam Power, and the Hydraulic Motors most suitable for Utilizing the Power in the best manner."

"On the Present State of Science with regard to the Manufacture, Purification, and Distribution of Coal Gas."

"On the 'Output' of Coal in the United Kingdom, as compared with that of other countries, illustrated by Statistical Tables, Plans, and Diagrams, showing where Coal is produced and when and how it is consumed."

The council have awarded the following (among other) premiums during the session 1873-74:—A Watt Medal, and a Telford Premium, to Alexander Carnegie Kirk, Assoc. Inst. C.E., for his paper "On the Mechanical Production of Cold;" and a Telford Premium to Joseph M'Carthy Meadows, for his paper on "Peat Fuel Machinery." They have likewise awarded the following prizes to Students of the Institution:—A Miller Prize to James Charles Inglis, Stud. Inst. C.E., for his paper on "Theory and Practice in the Construction of Tanks." And a Miller prize to George Edward Page, Stud. Inst. C.E., for his paper on 'Coal Gas and its Manufacture."

LANARK GAS COMPANY.—This company have just declared a dividend of 2½ per cent. on their capital stock, besides paying 5 per cent. on bonds, amounting to £2400, and reducing the overdrawn account at bank £710. They have also reduced the price of gas 10d. per 1000 cubic feet.

RATING OF THE BRISTOL GAS-WORKS.—The Bristol United Gaslight Company are the owners and occupiers of the gas-works which supply Bristol with gas. The property of the company extends over a district which embraces an area much larger than the boundaries of the ancient city of Bristol. The works or stations are three in number, and are situated at Canon's Marsh, Avon Street, and Maudlin Street, the two former being large works, the latter a small one, comprising, in fact, little more than one gasholder. The mains and pipes of the company extend throughout the whole of the parishes comprised within the boundaries of the ancient city, as well as into other parishes in the Bedminster and Clifton unions. When the new valuations were made in all the parishes, the company's assessments were very considerably increased, and the company appealed against the new assessment in every case. Much negotiation ensued, and ultimately it was referred, by mutual agreement, to the arbitration of Mr. John Clutton, of Whitehall Place, London, to determine and state in his award the total gross estimated rental and rateable value of the entire rateable property of the company, and also to apportion the same among the various parishes. The inquiry was commenced on Nov. 18, 1873, and was completed on Jan. 14, 1874. The late Mr. Horace Lloyd, Q.C., and Mr. F. Meadows White, Q.C., appeared for the appellants; and Mr. Field, Q.C., and Mr. Norris, Q.C., for the respondents. Mr. Edward Ryde of Parliament Street, Westminster, valued the works for the year ending June 30, 1871, at £10,959, and for the year ending June 30, 1872, at £7007. Mr. Townsend, the secretary to the company, and Mr. Fiddes, the engineer, were called to prove facts connected with the working of the company. Mr. Henry Finlay, engineer to the Surrey Consumers Gas Company, at Rotherhithe, and Mr. William King, engineer to the Liverpool United Gaslight Company (the largest provincial company), were called to prove that the various data upon which Mr. Ryde's valuation was based were correct. Mr. John Foster, an architect of Bristol, proved the structural value of many of the buildings. Mr. Thomas Hawksley (past president of the Institution of Civil Engineers) proved that he had given his attention a good deal to gas and its manufacture; that he was acquainted with a very large number indeed of the gas-works in England, and that he had also turned his attention to the principles and practice of rating gas-works; that he had seen Mr. Ryde's valuation, and did not differ from Mr. Ryde in general principles. He agreed with the greater part of his valuation, but there were a few little things in which, as might be expected, different gentlemen would hold different opinions; the amounts, however, did not vary very much in the general working out. Mr. Henry James Castle, of Chancery Lane, London, valued the property for the parishes at £20,412 for the year 1871, and at £15,849 for the year 1872. Mr. Alfred Penny, and Mr. George Wilson Stevenson, proved engineering facts connected with gas-works. Mr. William Sturge valued the property for the year 1871 at £17,683, and for the year 1872 at £13,828. Mr. Ashmead and Mr. Thomas confirmed Mr. Sturge's valuation. The result of the inquiry is that the arbitrator has awarded for the year 1871, £14,048; and for the year 1872, £10,445.

WASTE WATER PREVENTION.

REPORT OF MR. F. J. BRAMWELL, C.E., F.R.S., ON DEACON'S WASTE WATER METER.

To the Chairman of the Water Committee of the Liverpool Town Council.

Sir,—In accordance with a resolution passed on the 9th of March last at a meeting of the Water Committee, I have examined into the matters thereby submitted to me, and I now beg leave to report to you as follows:—

The subject under consideration—"the prevention of the waste of water"—is one to which I have paid much attention (especially in reference to the regulations for the water fittings of the metropolis), and I have always looked upon it, and I still look upon it, as one of a very important character, and also one which is surrounded by many and varied difficulties.

Even in the rare case where a town has a practically unlimited supply of water, it is most undesirable that it should be wantonly wasted, not only because the habit of waste is bad in itself, but also because the consumption of such a town is referred to as a sort of standard in the case of other towns where waste is going on, and where, in all probability, it cannot be so well afforded, and the authorities of these towns seek to justify themselves by showing that the expenditure of water cannot be very bad, because, after all, their consumption per head is far below that of the particular town where an almost illimitable supply has engendered the practice of gross waste.

In the generality of towns there is not this practically unrestricted supply of water, or, even if there be, it has to be distributed at the cost of engine power, and thus, as a rule, waste is a most serious matter. It stints the supply for the fair and reasonable wants of the consumers—as well the honestly careful as the wickedly careless, increases the cost, and thus either adds to the rates, where the water supply is in the hands of the corporation, or diminishes the profits where it is vested in a company; under such circumstances waste is felt to be an evil that cannot be allowed to continue, but must be put a stop to by some means.

One means—and a means which only too readily occurs to the mind of the engineer in the case of a town using the constant supply—is the doing away with that constant supply, and the reverting to the intermittent service.

The intermittent service can be speedily reverted to; it costs nothing in original outlay (although it is a source of current expense), and it goes a long way towards attaining the end sought—viz., that of preventing the waste of water.

But this mode of attaining the end is, in my judgment, a greater evil than is the waste itself.

I believe a constant supply to be, on sanitary grounds, a necessity; and on the grounds of economy and simplicity of management I believe it to be the most desirable.

With the intermittent service the water must be stored in cisterns. These, even in houses of considerable rental value, are very frequently placed in positions where it is difficult to obtain access to them for the purpose of cleaning, and they are also frequently so arranged that the foulest gases from closets and drains are brought into contact with the water. The constant supply does away with all these objections, and the water may be obtained for all drinking and culinary purposes direct from the mains, cool, fresh, and uncontaminated.

While many cities and towns (including places of such importance as Manchester and Sheffield) are in the full enjoyment of a constant supply, I look upon it as a perfect disgrace to the metropolis that it is still, with but rare exceptions, suffering under the evils of an intermittent service; and I fear that the fact of Liverpool having, on account of the waste of water, changed from the constant supply to the intermittent service, has afforded considerable aid to those who, in the metropolis, advocate that service.

But although the reverting to the intermittent service is the (unhappily) obvious way of preventing waste, it is not the only way, and it is not the way that would be adopted by those who fully appreciate the full benefits of an uncontaminated water supply, and who are prepared to encounter much vexatious labour to set right that which is wrong. Such persons prevent waste by getting rid of defective fittings, and by putting an end to all grossly negligent manners of dealing with the water.

But, under ordinary circumstances, this method of putting a stop to waste is a most difficult and arduous one. It involves a "house-to-house" visitation—a tedious work, and a work attended with great cost. Moreover the careful man, who keeps his fittings in good order, and deals with the water fairly, is annoyed at having an inquisitorial visit paid to him, and he is apt to feel that his care and attention have been bestowed in vain; for they have not saved him from being an object of suspicion, and from incurring the same treatment as is applied to his reckless neighbour. It is, therefore, on the score of expedition and cheapness, and, above all, on the ground of not offending the careful consumer, most desirable that there should be some means by which it may be determined whether or not a visit of inspection is necessary.

It has been sought to obtain preliminary knowledge in Liverpool and elsewhere by applying some kind of ordinary water-meter to the service-main of a district, so as to judge from the registration of the meter whether the consumption of this particular district was above or below the average; but such meters, although they record the total quantity of water passed through them, do not record the hour of the day in which it passes, and thus they fail to afford that most valuable information in the case of bad fittings or negligent use, namely, what is the nocturnal rate of expenditure, it being well known that an habitually large expenditure during the night must be due to waste. The only way of obtaining the nocturnal rate of expenditure with ordinary meters is to visit them at any desired hour, and to note the rate of movement. This is a possible process, and has, in fact, been used in your town; but it is a very troublesome one, there is liability to mistake in the reading, and, as there is no self-registration, there is nothing by which any error may afterwards be rectified.

Your engineer, Mr. Deacon, has set himself to devise a meter which shall leave a permanent record of the rate of expenditure of the water passing through it, and thus enable the engineer to see, on reference to these records, what was the quantity of water per hour passing through at each and every hour (in fact at every moment) of the day and night, and it is this waste-water meter which you have asked me to make the subject of examination and report.

The meter proper consists of nothing more than a vertical truncated hollow cone, having its small end upwards, and containing within it a disc of the same diameter as the small end of the truncated cone; a central stalk on the upper surface of this disc is suspended from a fine German silver wire, which passes, practically water-tight, through a small hole in the upper part of the chamber above the cone, and is attached to a guided cross-head, carrying a pencil or tracer, and having above it a band passing over a pulley, and supporting on the other side of the pulley a weight, which is a determinate amount heavier than the cross-head and disc, when the disc is weighed in water, so that the weight always tends to draw the disc up to the top of the truncated cone. The inlet for water is in the chamber above the cone, the outlet proceeds from a chamber below its base.

In the upper chamber there is a diaphragm, with openings to equalize the flow of the water.

Assume that water is supplied to the meter, but that none is passing through it, because all the outlets are closed, then the weight will have raised the disc to the extreme point of its travel, and so that the disc fills up the aperture at the top of the cone. If now a cock in the outlet be opened, say, to a small extent, water will seek to flow, but, in endeavouring to do so, it must press upon the disc, and send it downward to a larger part of the cone, and the point where the descent of the disc will cease will be that at which the annular area between the edge of the disc and the interior of the cone is sufficient, under the difference of pressure between the upper and the under side of the disc, to enable the required quantity of water to pass; and this pressure will obviously be, for the whole surface of the disc, exactly that which will balance the excess of the weight above the weight of the disc, weighed in water, and the cross-head weighed in air. If the pressure were less than this, the weight would cause the disc to rise until the annular area was so much diminished that the required pressure to balance the surplus weight was just adequate to drive through this annular opening the quantity of water being drawn from the outlet; on the other hand, if the pressure were greater than the surplus weight, the disc would descend until the increase of annular area would be such that, at the pressure equal to the surplus weight, the quantity of water demanded would flow through. In this manner the point of rest for the disc, with the supposed quantity being drawn, would be self-found; and, similarly, if a less quantity or a greater quantity (within the limits of capacity of the meter) were drawn off, the disc would find its appropriate position of rest in the truncated cone, a position corresponding to the particular quantity passing through. But the tracer rises and falls with the disc, and, if this tracer have a piece of paper presented to it, it will draw a vertical line on that paper, the length of which will indicate the rate at which the water is passing through the meter; and, if this paper be printed with horizontal lines representing hundreds and thousands of gallons per hour, then an inspection would show at which of these lines the tracer were standing, and would enable an observer at once to say: "Water is now passing through the meter at a velocity equal to 1000 gallons or 3000 gallons per hour," as the case may be.

The foregoing is the construction of the meter proper; but if no further provision were made there would not be left any other record than this—viz., that since the paper was put on, the rate of consumption had at some time attained a point indicated by the length of the vertical line on the paper; but it would be impossible to say when the maximum recorded rate of consumption was reached, or for how long it endured. Such an apparatus would give a record analogous to that of a self-registering thermometer, as from this implement all that can be ascertained is that at some time since the index was last set the maximum temperature has been a certain number of degrees, but when this happened, or for how long it continued, there is no means of ascertaining.

But if a further provision be made by which, as in the steam-engine indicator, the paper presented to the tracer can be caused to move sideways, then the tracer will no longer describe a mere vertical line, but it will describe a line compounded of the lateral movement of the paper, and of the rise and fall of the tracer. In practice, Mr. Deacon causes the paper to move sideways in the manner employed in apparatus for automatically recording the pressure of the wind and other similar phenomena; and in the manner in which the "pressure papers" of the governors of gas-works are actuated—viz., by wrapping the paper round a vertical cylinder to which motion is given by a common clock movement, so that the cylinder makes exactly one revolution in the 24 hours. The paper is divided vertically by 24 "hour lines," representing the hours of the day and the night, and as has already been said, is divided horizontally by lines indicating the rate of flow in gallons per hour, and thus an examination of the line made by the tracer shows what was the rate of flow at any time of the day or night.

Water-meters, such as are used for registering the quantity of water as taken by a consumer, are ordinarily divided into two classes—viz., positive meters and inferential meters. The positive meters are those in which a measuring-chamber is alternately filled or emptied, and the number of those fillings is recorded. An inferential meter is one in which, by the velocity of the current passing through the meter, movement is given to indicating apparatus. Meters of this latter class have the merit of simplicity and of cheapness; but they do not, as a rule, record small quantities with the same accuracy as such quantities are recorded by meters of the positive class. They are, however, in received and very general use for gauging the quantity of water supplied to those who pay by meter.

Mr. Deacon's waste-water meter, now under consideration, is of the inferential class, and, like such meters, although its indications are very close to the truth, is not absolutely accurate; but it must be borne in mind that for the purposes for which Mr. Deacon has devised his meter, absolute accuracy in the registration of small quantities is not essential. That which is wanted is to indicate, and to put on record, whether there is an unreasonable amount of water being used in a district at particular times of the night and day, and this Mr. Deacon's meter indicates with great fidelity. I have made very careful experiments with his meter, under pressures varying as much as five to one, and with the meter in proper order, and also with it purposely put out of order by blocking up several of the inlet orifices so as to endeavour to get irregular action, and I have satisfied myself that the records given by the meter may be thoroughly relied on for the purpose for which it is intended.

The meter, with its clock, is contained in a neat cast-iron box with a hinged lip at top; this box is let into the ground below the footway, the lid is padlocked, and is covered by another lid, carried in a frame in the flag-stones.

When it is intended to introduce one of these meters into a district, the service-main is cut, and a curved pipe is jointed to lead the water to the meter inlet, and another curved pipe is supplied to convey the water from the outlet to the main again.

In this manner all the water delivered by that particular service-main is compelled to go through the meter, and the paper being put on the vertical cylinder, a daily record is got of the behaviour of the district as a whole; and not only is the rate of flow at any moment known, but a very good estimate can be made as to the total number of gallons which have been delivered to the district in the 24 hours.

If, on an examination of the record paper, it appears that the district has taken an improperly large quantity of water, and especially if it is discovered that there has been a heavy consumption throughout the night, then there is strong reason to suspect waste; and it becomes necessary to make an investigation into the condition of the service-mains and services, into the state of the fittings, and into the amount of care which is exercised in the district in the use of the water.

I spent several hours on each of two nights in the streets of Liverpool, for the purpose of making myself thoroughly acquainted with the manner in which your officers avail themselves, in practice, of Mr. Deacon's meter to guide them in this investigation; and I will give an account of one of the night's proceedings.

On reaching the meter, between eleven o'clock and midnight, we found there was a consumption going on at the rate of nearly 3000 gallons per hour; this was clearly a consumption that could not arise from any proper use of the water at that time of night. We then proceeded through the district, to ascertain at which of the houses the waste was taking place, and the manner of doing so was as follows:—Outside each house or other place supplied with water there is in the service-pipe a stop-cock, which can be turned off in the street by the inspector.

As each house is reached, the inspector applies the turning-key to the plug of the cock, and then applies his ear to the top of the key, and by the sound can ascertain whether water is passing through. The turning-key acts as a stethoscope, and those who are accustomed to its use can readily detect the passage of even small quantities of water; and if they are in doubt, the partial closing of the cock generally sets the question at rest, as the diminution of the aperture adds to the velocity and increases the sound. If water is heard to pass, the cock is shut off, and the number of the house and the extent of the noise are noted in the inspector's book.

When every cock through which the passage of water can be detected has been closed, the meter is revisited. On the particular occasion of which I am speaking, the result of the closing of the cocks where noise was heard was to

diminish the rate of expenditure from 3000 gallons per hour to 720 gallons per hour.

By the before-described examination the inspector is enabled to ascertain at which of the houses in the district waste has been going on, and thus, on the following day, only these houses need be entered; and in this manner the labour and loss of time of a house-to-house visitation throughout the district is rendered unnecessary, and the offence of such a visit to persons whose fittings are in good order and who do not waste water is avoided.

I had abundant opportunity of satisfying myself as to the sensitiveness of the meter. One instance was very striking. At about half-past one in the morning we had reached a place where a great rush of water was heard. This was found to proceed from the leaving open of a tap which supplied a public trough closet in a court. This tap we closed, and noted the exact time. On examining the meter, a distinct vertical line was found to have been drawn at this very hour, indicating the reduction of a large number of gallons per hour. I had caused stand-pipes to be fixed in different places on the service-main, so that I could make waste wherever I desired, and I found that the meter was as alive to the opening of cocks at distant parts of the service as it was to the opening of cocks close at hand. The meter also enables the condition of the service-mains and pipes to be ascertained. If, for example, on shutting off all the cocks in a district through which the flow of water can be detected, there should still appear a large nocturnal consumption, then it must arise either from the passage of water through the stop-cocks, but at too slow a rate through each to be detected, or it must arise from the imperfect condition of the pipes. To test this all that is necessary is to close every stop-cock in the district, and then to re-observe the meter. If the expenditure has been stopped, or diminished, then it is clear that there was a passage of water past the stop-cocks not detectable by the ear; but if the expenditure continues, then it is evident that it arises from defects in the service-mains or in the service-pipes.

I have already said I believe Mr. Deacon's meter to be thoroughly effective for the purpose for which it is intended; and I will now add that I believe it is not at all likely to get out of order, and that its first cost should be, when manufactured in quantities, extremely moderate. Having regard to these considerations, I have no hesitation in advising the Water Committee of the Town Council of Liverpool to employ Mr. Deacon's waste-water meter in all their districts; and I have no doubt that if this be done, not only will the average expenditure per head be materially diminished, but that that diminution will be accompanied by all the benefits and all the simplicities in service attendant upon a constant supply.—I have the honour to be, sir, your obedient servant,

(Signed) F. J. Bramwell.

37, *Great George Street, Westminster, S.W., June* 20, 1874.

ON SEVERAL QUESTIONS OF IMPORTANCE IN GAS INDUSTRY.

[A Paper read before the Meeting of the "Société Technique de l'Industrie du Gas en France" on June 23, 1874.]

By M. Servier.

It is my duty, according to the order of the day which you hold in your hands, to give you an exposition of many points bearing on the industry of the gas manufacture. I beg of you to understand that I have not myself chosen so extended and difficult a subject to treat on. When our provisional committee met to arrange the order of the day of the assembly's meeting, I was kept at Metz by business, and therefore could not be present at its sitting. My kind colleagues did me the honour to charge me with the exposition of questions which should become the object of our work. I did not wish to rob myself of this honour, but I take the liberty of reducing my task to that of entertaining a small number of questions, and in doing so claim your indulgence.

My wish, of all things, is to draw attention to the advantages we may derive from the association we have founded, if, as I think, each of its members should bring before us the fruit of his researches, of his observations, and of his experience.

The most important subject before us is *coal*—our staple material. It may be said that it will be inexhaustible, for, if we have but one word to designate this natural product, we all know how great are its varieties, and how much each variety is subject to variations in its quality.

Well, each of our works, by its geographical position, by its proximity to or distance from the mines, by the means of transport which bring it—the sea, rivers, canals, railways—each of our works, I repeat, employs coal of different sources. Each of us knows, therefore, the particular character of coal we employ either by daily use, or by special trials or analyses.

You see, therefore, gentlemen, the interest which our association has in collecting separate trials, all individual analyses, and to co-ordinate these for the purpose of forming a complete repertory of coal employed in the manufacture of gas.

On another hand, the price of coals, which, during latter years, had progressively fallen, or was oscillating within narrow limits, was subject, during the unfortunate war of 1870, to an exceptionally high price, which paralyzed our industrial interests. Have we not to examine what should be the means for remedying this state of things on one side; and, on the other, ought we not to shelter ourselves against such eventualities by introducing into contracts with cities a clause which should regulate the price of gas according to the price of coal? These are certainly important subjects to treat on.

Respecting the construction of gas-works, we have many interesting matters to deal with. The retort-ovens will furnish a most inexhaustible matter for discussion. Without speaking of the form and dimensions that should be given to retorts and furnaces, the most convenient surface of fire-bars, of small or of large chimneys, I shall call your attention to certain points which I consider as very important.

It is admitted at the present day that to obtain the greatest quantity of gas from coal, it is necessary to distil it at a high temperature. It is, therefore, necessary to burn the fuel with a quantity of air only strictly necessary, and to previously heat this air. We must, therefore, examine the different systems employed for this purpose, and particularly the system of Siemens, and its derivatives.

But it is not sufficient to produce heat; it is necessary to lose as little as possible. Now, all our ovens are so constructed that a great portion of the heat is lost by the walls. One of the managers of the Parisian Company, M. Letreust, has conceived the idea of constructing, on the front part of the oven, a thick wall, which would enclose the heads of the retorts and the ascension-pipes; the lids of the retorts would be double, enclosing a chamber of hot air, or rather hot gas, before the mouth of the retort. From this arrangement a great economy would arise in respect to heating.

I push this idea still further by proposing to enclose the entire oven under a thick bed of fire-clay; for example, in such a manner as that the oven would resemble a casemate. The front portion being very thick, as M. Letreust proposes, it is evident that the loss of heat by radiation would be very small, or perhaps nothing, and I believe that by such means an important economy in heating would be arrived at.

We do not yet know the theoretical quantity of heat necessary for the distillation of one kilogramme of coal, as we do know what is necessary for converting one kilogramme of water into steam; but there is little doubt that it is only a small fraction of that which we produce to attain that result on account of the loss which takes place by radiation and up the chimney. There is therefore here a great field for experiment in the way of progress, and I call your attention to this point.

Another question not less important is continuous distillation. I know of only a few trials of the method, but I believe, however, that it will be the future of the gas manufacture. The problem to resolve is to construct an oven, in which the coal shall be introduced at the upper part, while the coke is drawn from the lower part, the distillation being continuous in the middle of the oven.

The condensation of gas has received an important improvement in the apparatus of MM. Pélouze and Audouin. My esteemed colleague, M. Ellissen, will speak on its details.

Purification is now generally carried on by means of the oxide of iron, but the preparation of this material varies greatly according to the works. We have to seek for better methods, as also for a better mode of employing it. I believe, for my own part, that the oxide of iron ought to be prepared alone, and afterwards mixed with the sawdust, which only facilitates the passage of the gas. I have reason to believe that in first impregnating the sawdust with the sulphate of iron, which is at last converted into oxide of iron, all the oxide which remains in the interior of the pieces of sawdust remains inert. I think also that the surface of the purifiers ought to be as large as possible; in other words, that it should only be limited by the expense of first establishing the apparatus. The greater the surface of the purifiers, the more active is the material.

This consideration leads us to examine the question of the construction of purifiers in masonry. I am of opinion that we could construct these kind of purifiers perfectly sound, on the condition of carrying the hydraulic way to the bottom of the vessel, and covering the bottom with pitch. It is evident that such purifiers would be much less costly than those of cast iron.

Gasometers are the most expensive part of a gas-work. We shall have to study the means of diminishing their price. I have some time ago made trials on the subject, and I shall have pleasure in communicating the result to you. For the present, I shall say in few words that my idea consists in making the gasometer dry, and of high pressure. Imagine large iron boilers, placed upright or laid side by side, and in which the gas shall be compressed to the extent of many atmospheres, thus practically multiplying their capacity.

You see, gentlemen, that we have before us a vast field of study, and if you examine the roll of the members of our association, you will recognize that we have already all the necessary elements for treating with authority the most important questions of our industry. I could cite, also, many names which we have not with us; but I do not doubt that they will soon join when they shall have found that the association is not a coterie, but a technical society, where each individual can produce, and make valuable for the benefit of the association, the entirety of the industry which it represents.

Besides the subjects which I have already indicated, how many important questions have we yet to discuss in the shape of mains for distribution, of better joints, of meters, of regulators, of aspirators or extractors, of photometers, of gas-engines, of ammoniacal products, and the derivatives of tar. Their enumeration alone would cause me to exhaust your patience; and, as I said at the commencement, I have not intended to give you an exposition of all the important questions relating to gas, but only a simple view of a few among them.

Carlisle Corporation Gas-Works.—At the monthly meeting of the Carlisle Town Council, on Tuesday, the 8th inst., a resolution of the Gas Committee, recommending that the price of gas be reduced from 3s. 6d. to 3s. per 1000 within the city, and to 3s. 4d in the out-districts, was brought up and adopted. The annual accounts, which were submitted, showed that there had been received for gas sold, £15,056; coke, £4054; tar and ammoniacal liquor, £1431; meters, fittings, castings, old metal, &c., £3604. The *expenditure* included £11,703 for cannel, coal, and cartage; £3195 for wages; salaries, £564; &c., leaving a balance of profit for the year of £2924. The balance had been thus appropriated:—Annual payment to corporation, £200; to the city fund (for the fishery lawsuit costs), £1854; extensions, £329; interest on deposits, £150; balance, £390. The capital account shows that the total expended in the works (less one year's depreciation) was £34,203; stock of materials, &c., £4229; reserve-fund invested, £7468; gas accounts due, £6867; and other items, raising the total assets to £57,199. Deduct £11,505, amount of loans on mortgage; £1088, deposits; £1437, sundry creditors; balance, "being excess of assets over liabilities," £43,018.

Large Pumping-Engine.—We extract from the *Kilmarnock Standard* the following description of a large pumping-engine just constructed by Messrs. Barclay and Son of the Caledonian Foundry:—"About three years ago the Nitshill and Lesmahagow Coal Company commenced sinking two pits upon a large field of the celebrated Lesmahagow gas coal. These pits are to be 200 fathoms deep and made circular, 12 feet diameter. This great depth rendered it necessary to have very heavy winding machinery, and as the company's manager intends to drain the other mines belonging to the company in the district into the main pit, it required an engine of such an enormous size to do the work, that we may say it is unequalled by any other pumping-engine in the country. On the rise pit, which will be used for winding purposes alone, there is fitted a pair of coupled horizontal winding-engines, the cylinders of which are 32 inches diameter, and 6 feet stroke. These cylinders are fitted with Cornish valves worked by a link motion and expansive cam arrangement invented and patented by Mr. Barclay. They are also arranged with parallel motions instead of slides. The reason for adopting this arrangement in the present instance was the fact that Mr. Barclay, about 18 years ago, fitted up for the same company at Nitshill a pair of 12-inch cylinder engines, which from that time till now have never cost the company anything for repairs, the same brasses being in use that were originally fitted to the engines. The drum of the 32-inch engines is 16 feet in diameter, and makes 24 revolutions in winding the cage from bottom to top, this being done in 30 seconds. Upon the dip-pit, which is to be used principally for pumping, is fitted one of Mr. Barclay's patent compound pumping-engines. The high-pressure cylinder is 64 inches in diameter, and the low-pressure cylinder 100 inches in diameter, the stroke in the pumps being 12 feet. The main beam of the engine is 54 feet long, made of malleable iron—box section 6 feet deep by 3 feet broad. The weight of this beam is 20 tons. The two cylinders, with their jackets, covers, and sole-plates, weigh 86 tons. The cylinders are double-acting, and in order to counterbalance the steam on the top side of the pistons with the extra weight of the pump-rods, there is fitted underneath the engine a ponderous balance-beam. This beam is also made of malleable iron, and weighs 25 tons, and there are 76 tons of cast-iron balance-weights, fitted into a box at the back end of the beam. Considerable difficulty was experienced in the transporting of the machinery from Kilmarnock to Lesmahagow, owing to the enormous size and weight of the engine. A special train had to be engaged to take part of it to its destination on a Sunday, as it was otherwise impossible to get the large cylinder &c., conveyed along the line and keep clear of other traffic. The pumps which this engine works are 24 inches in diameter, and before leaving the foundry were tested to a pressure of 500 lbs. to the square inch. These pumps will deliver 55,260 gallons of water per hour, with the engine working at four strokes per minute. On the same pit are also fitted a pair of coupled horizontal engines, the cylinders of which are 22 inches in diameter, 4 feet stroke, geared in the ratio of 6 to 1. These engines are likewise fitted with parallel motion, but with ordinary slide-valves. They are for the purpose of lifting the heavy weights in the pit. Between this and the winding-engine house is placed a range of six boilers, 7 feet 6 inches in diameter and 26 feet long, with two flues in each. They are all double-riveted, fitted with the latest improvements, and made to stand a working pressure of 60 lbs. per square inch. The whole machinery is very complete and substantial, and at the opening trial the appearance and efficient working of the engines afforded great satisfaction."

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Taken as a whole, the heavier branches of trade continue to manifest increased symptoms of activity, many of the larger establishments being again briskly engaged. The leading foundries—such as Staveley—remain busy on large orders from local and various other gas and water companies for pipes, sockets, collars, and general castings. It is understood that this class of work is being undertaken at little, if anything, over £7 per ton. Last week, the Duke of Buckingham visited the Staveley Works, and was shown the cone, &c., of a large casting, which was cast on the ensuing day. Its dimensions were 18 feet in length, 5 feet in diameter, and weight 23 tons. It was intended for a steam cylinder. At these works two additional blast furnaces are being built. There is a fairly well-sustained inquiry for best tool steel, otherwise the general cast steel trade remains in a very quiet condition.

The brassfounders and brassworkers are now quite as busy as when last alluded to. In addition to the accession of home orders which has very naturally resulted from the widespread adoption of the constant supply system, and the necessarily accompanying regulations, there has of late been a strong demand for water-works, sanitary and general plumbers fittings for the Continent and South America. A large proportion of these commissions have fallen to the share of the leading firm in this locality, the pressure being, I am informed, so great that sufficient men cannot be obtained to get the work out of hand.

Middlesborough and general Cleveland pig is tolerably firm at these figures: No. 1 foundry, 75s.; No. 2 foundry, 71s.; No. 3 foundry, 68s.; No 4 foundry, 65s.; No. 4 forge gray, 59s. 6d.; No. 5 forge M, 57s. 6d.; No. 6 forge W, 56s.; refined metal, Kentledge, and cinder as before.

It is stated that the Sheffield United Gas Company's engineer (Mr. Herbert Unwin) has resigned that post. Mr. Unwin is the son of the late manager, Mr. Edwin Unwin. It is rumoured that his successor will be a gentleman from beyond the Humber.

The South Yorkshire and Derbyshire coal trades are tolerably active, mainly in the house coal department, although it must be admitted that there is a better inquiry for steam coal. Trouble is again threatened by some of the miners, who have received notice of a further drop in wages. I hear of several contracts having just been placed for gas coal. The average price is from 11s. 6d. to 12s. 6d. per ton. The Barnsley Gas Company is understood to have again put its fuel contract into the hands of the proprietors of the East Gawber Colliery, who have for some years held it, part of the time at a loss.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The improvement in the local iron trade noticed in last report is still maintained, and the prospects of business for the ensuing quarter are very encouraging. It is quite clear that the trade has now recovered from the recent depression, and, though many large specifications are still withheld, in the hope of easier quotations, yet the orders actually placed are sufficient to keep the mills and forges more fully employed than they have been at any time during the current year, and the general tone of business is decidedly healthier. Plates and sheets are still in greater request than other descriptions of merchant iron, and the mills engaged in the production of the same are in especially active operation. Prices are nominally unchanged, and, as a rule, are firm, though some of the smaller manufacturers are making slight concessions, and common bars may now be had at £9 15s.

In the tube trade there is a fair degree of animation, though consumers still order very cautiously.

The ironfounders are tolerably well employed on machine castings, and gas and water mains are in steadier request. The demand for pig iron is much steadier than last reported, and the tone of the market, on Thursday last, was rather suggestive of a rise than any further decline in prices, additional blast furnaces continue to be re-lighted in various parts of the district, in the prospect of cheaper fuel, and there is little doubt that the reduction in the price of coal has already been discounted to some extent.

A meeting of the Coalmasters Association was held at Dudley, on Friday last, when it was decided to reduce the price of coal 3s. per ton from the 1st of October next, and there can be only one opinion as to the effect of this measure upon the general industries of the district. Large stocks of fuel have accumulated at nearly all the collieries notwithstanding the limited output, and it is evident that the reduction has been postponed as long as possible.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

The coal trade in the Manchester district is exhibiting signs of sensible improvement; prices are decidedly stiffer, and there is far less underselling. Although there is no actual advance in quotations, colliery proprietors in some instances, where their customers had obtained slight concessions, are intimating that the full rates will be adhered to, and all the leading coal-owning concerns are firm in their prices. Gas coal, which has been rather dull of late, has met with more inquiry, and some tolerably good orders have come into the market. Prices are steady, and range for screened coal from 12s. to 14s. per ton at the pit mouth. With regard to gas cannel, as intimated in a previous report, colliery proprietors have mostly already contracted for all their available get, and there is very little offering in the market. For house coal there is a steady inquiry; furnace coal, although perhaps not quite so brisk as of late, is in tolerably good demand; there is a better sale for engine coal, although full rates for burgy and slack cannot always be obtained, in consequence of the large supplies which are now offering in the market, both from the collieries in the Lancashire and other districts. The pits in the immediate neighbourhood of Manchester are all tolerably well employed, and stocks are not accumulating to any extent.

As was anticipated in a previous report, a strike in West Lancashire seems now to be almost certain. When the men had declined the concession of 10 per cent., it was scarcely to be expected they would accept the full 15 per cent. reduction now insisted upon by the masters; and, at a numerously attended meeting of delegates, it has been unanimously decided not to accept the reduction, arbitration in the matter being again demanded. The reduction does not come into force until the 30th inst.; but already preparations are being made on both sides for a strike, and, in addition to the colliers, the masters are reducing the wages of the other *employés* about the pits. Trade, as a consequence, is at present in a disorganized state; but it is not likely that the strike will be of a protracted character.

The Lancashire coke trade is, if anything, a trifle steadier, and prices are without change.

A steadier business continues to be done in the iron trade of this district, and consumers generally are buying more freely than they have done of late. Both founders and forge proprietors continue well off for orders; some of the latter have covered their requirements in pig iron to the end of the year. Middlesborough makes of both foundry and forge iron are stiffer in price to the extent of 2s. 6d. per ton, and are now quoted as under for early delivery in the Manchester district:—No. 1, 86s. 3d.; No. 3, 78s. 9d.; No. 4, foundry, 75s. 9d.; and No. 4, forge, 68s. 9d. per ton. Manufactured iron remains without any material change; but prices are steady. Puddled bars, delivered, are worth about £6 14s.; heavy rails, £8 15s.; light ditto, £9 5s.; ordinary bars, £9 15s.; sheets, £12 15s.; and boiler plates about £13 10s. per ton.

COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

As anticipated last week, the threatened strike of the Durham miners has caused a great amount of excitement, especially in the gas coal trade, and every company that was short of stocks has been tolerably urgent to have them made up. The coalowners, however, declined to guarantee shipment after a certain date, though it is notorious that there are heavy stocks on hand at the pits, and something like a panic might have ensued but for the fortunate appearance of a circular in the middle of last week, issued by the executive of the Durham miners' union, who very strongly urged the men to refer the entire question of reduction to arbitration. This unexpected concession to public opinion considerably altered the situation, and there has been less feverish excitement upon Newcastle Exchange with regard to the shipment of coals since. Prices have not altered very materially from late quotations. Of course, it is difficult to predict what turn affairs may take in the county of Durham, for the committee of the miners' union there have not a very firm control over the men; but the prospect of an amicable settlement is much more hopeful than it was. In the Northumberland mining district, where a similar dispute about a reduction of 20 per cent. prevails, the course of events is gradually working the point in dispute to arbitration. There is not the least fear of a strike in that county.

The shipments of gas coals were very active upon the Tyne last week. Coasting vessels were more in demand. Higher rates had to be paid them, and higher freights would have been paid to handy vessels than those current, if they had been in the harbour. Steam coals were less inquired for for shipment to the Continent; but there was a better coasting business. There was no improvement in the demand for manufacturing coals, which are just as dull and as low in price as ever.

On account of the threatened strike of the Durham miners, the Cleveland iron trade has been a good deal disturbed, but generally trade has been very flat. Buyers have not been at all pressing, and the general tone of business in the iron district was not quite so good last week. There has been a deal of activity in the shipment of fire-clay and other goods to the Continent, and the general business of the North of england is tolerably steady. The chemical trade has been firmer. The large engine works of Newcastle, as previously reported are very full of orders, and the prospects at present are that business in these establishments will increase rather than diminish. There is a particular demand for marine engines of great power and locomotives.

The labour market in the North of England is about tolerably well balanced. It cannot be said that there is an excess of men, especially skilled workmen, who command high wages.

HASTINGS AND ST. LEONARDS GAS COMPANY.—The annual meeting of shareholders was held at the works on the 3rd inst.—Mr. G. Scrivens in the chair. The chairman alluded to the questions of dear coal and cheap coke, which had so influenced the present half year's accounts, the coal having been bought in 1873, when prices were high, and the coke having to be sold in 1874, when prices were low. Hastings, he stated, was badly situated for the sale of coke, much having to be sent away, while it was equally badly situated for the purchase of coals, as there was double carriage, and a duty of 2s. 4½d. per ton after the coal reached the town. He, however, congratulated the shareholders that the difficulties of the company were partially overcome, and although they had now to draw upon the reserve-fund for their ordinary dividend, he remarked that the fund was put by a year ago for that express purpose. He moved the adoption of the report, which was seconded by Mr. Hallaway. Mr. Chandler drew attention to the stock of coke, and thought it would be better to get rid of it at any price rather than let it clog the works. Mr. Wood (the manager) said that was just what they had been doing; they had sent large quantities away by every line of railway out of Hastings at a great sacrifice, and had reduced their once heavy stock to about 200 chaldrons. After some other conversation about reducing the price of gas—Mr. Reeves contending that the company ought to do so, or the consumers could not light up their shops so freely as they wished to—the report was adopted. Messrs. Parks, Brown, and Hayles were again re-elected on the directorate, and Mr. F. Bennetts as auditor. The dividends paid were 8 per cent. on the old shares, and 7 per cent. on the new.

THE LATE DARWEN GAS COMPANY AND THE LOCAL BOARD.—At a meeting of the Darwen Local Board, on Monday, the Gas and Water Committee reported that Major Cox had been sent down to take evidence as to the reasons for the board wishing to borrow the sum of £5000. The inspector expressed the opinion that the old gas company ought to refund the sum of £2591 11s. 1d., alleged to have been illegally withdrawn from the bank by them five months after the undertaking had been sold to the local board. An animated discussion took place on the minutes in which this report is made. The clerk said the purchase of the gas-works was effected on the 1st of January, but the board did not take possession till June, because the contract was not signed, and the directors of the gas company withdrew £2591 from the bank, and distributed it to the shareholders as bonus. Several members expressed the opinion that the directors had no right to draw this cheque on the bank whilst they were temporarily acting as agents for the local board till they appointed their own executive.—The chairman said if the directors had the right to draw a cheque for £2500, they had the right to draw one for £25,000. The clerk said the explanation of the directors was this, that the sum of £2591 was owing by capital to revenue, inasmuch as the gas directors did not call up as much money as they ought to have done to carry on the undertaking, and the local board would have had to pay 7½ per cent. on the total amount called up, whereas they borrowed from revenue, and when the board took the undertaking they could borrow money at 4 per cent.; therefore the board would have a clear gain of 3 per cent. The amount in question represented the sum owing by revenue to capital. The board resolved to take counsel's opinion as to whether the money could not be recovered from the persons who had signed the cheque.

SERIOUS EXPLOSION OF GAS AT WORCESTER.—On Friday night, just before eleven o'clock, the inhabitants of Worcester were greatly alarmed by the gas throughout the town suddenly going out. The alarm soon spread, and hundreds of people proceeded in the direction of the gas-works, Rainbow Hill. There was the greatest confusion, and the wildest rumours prevailed. It was soon ascertained that a violent explosion of gas had taken place in three or four houses at Rainbow Parade, adjacent to the gas-works. It appeared that from some cause or other one of the large mains running along the road there had burst, and the escaped gas had percolated through the ground, filling the houses in the street. The large volumes of gas soon came into contact with the lights in the houses, and explosions took place in three or four of them simultaneously. At one house a man named Dance was seriously burned, and his hands and other parts of his body badly cut, and he was taken to the infirmary. His wife and family miraculously escaped. The furniture was destroyed, the doors and windows blown out, the staircase carried away, and the whole house and contents are a complete wreck. Two other houses adjacent are almost as badly injured, but fortunately the inmates escaped. As soon as the explosion took place a relay of men were put on, and dug large holes in the road to relieve the other houses of gas, as it was accumulating in most of them in the street. Some of the furniture in the houses caught fire, but the flames were speedily extinguished by the police and others with extincteurs and buckets of water, so that the police hose and engines were not required. The gas was turned off at the works, and the town was in darkness all night. It will not be turned on until this morning. Up to the present time the cause of the escape is unknown, but it is supposed that some heavy waggons passing over the road must have caused the main to burst. —*Birmingham Daily Post.*

CHATTERIS GAS COMPANY.—The annual meeting was held on the 7th—Mr. A. S. Ruston in the chair. The accounts showed an available balance of £369, out of which a dividend at the rate of 8 per cent. was declared. It was decided that the reduced price charged for gas during the past quarter—viz., 5s. 10d. per 1000, should be continued, with a discount of 10d. per 1000 feet for prompt payment.

TAMWORTH PUBLIC LIGHTING.—At a special meeting of the Tamworth Town Council, last week, the town-clerk submitted the draft of an agreement which he had received from the gas company, with respect to the lighting of the public lamps during the ensuing winter. The price of gas was fixed at 5s. 6d. per 1000 feet, subject to a discount of 5 per cent. if paid within a month of the bill falling due. The agreement was approved.

PEEBLES GAS COMPANY.—At the annual general meeting of this company, held last week, it was unanimously resolved to declare a dividend of 6 per cent. on the capital stock of the company, and to transfer £30 to the suspense account for extraordinary repairs. The revenue for the year ending the 26th of May last had amounted to £1478 19s. 11d., and the expenditure to £1244 11s. 6d., leaving a balance of £234 8s. 5d. available for dividends, &c. On the recommendation of the directors, it was agreed to reduce the price of gas at Martinmas next from 7s. 6d. to 6s. 8d. per 1000 feet.

A MARKET TOWN WITHOUT GAS.—A local paper says, Wetherby is in a most extraordinary position—it has no supply of gas. In the early part of last year the affairs were thrown into Chancery, and since then the works have been standing idle. During the summer months the inhabitants have not experienced any great amount of inconvenience, but as winter approaches the state of things appears serious. There is no light except lamps or candles for the place of worship, and the streets are in total darkness. How long this will last it is impossible to say, but it is a serious thing for the shops and other places of business.

REDUCTIONS IN THE PRICE OF GAS.—The directors of the Falmouth Gas Company announce a reduction in price from 6s. 8d. to 5s. 10d. from the 29th inst. The Maidstone Company announce a reduction from 4s. 6d. to 4s. on the 1st prox., and the Keighley Local Board have made a reduction from 4s. 2d. to 4s. The Corporation of Hamilton, N.B., have, upon the advice of their Gas Committee, reduced the price from 5s. 10d. to 5s. The Redruth Gas Company have intimated their intention of reducing the price of gas 6d. per 1000 feet, and at Hartlepool the price will be reduced from 4s. 6d. to 4s. 3d. at the expiration of the present quarter. The Corporation of Carlisle have reduced the price from 3s. 6d. to 3s. within the city, and to 3s. 4d. in the out-districts. At Peebles, on the recommendation of the directors, the annual meeting of the company decided to reduce the price of gas from 7s. 6d. to 6s. 8d. The Lanark Company have reduced the price from 8s. 4d. to 7s. 6d. At Montrose, the directors of the company have resolved upon a reduction of 5d., making the present price 6s. 8d.; and at Biggar the price is now 9s. 2d., having been reduced 1s. 8d. per 1000 cubic feet.

Register of New Patents.

3.—LAMONT, J., Glasgow, "*Improvements in the manufacture of illuminating gas, and apparatus or mechanism connected therewith.*" Provisional protection only obtained. Dated Jan. 1, 1874.

This invention consists in the construction of a portable apparatus for the manufacture of illuminating gas from crude mineral and fish oils, applicable for supplying with gas such places as are not in connexion with public gas-works. The retort is made in the form of a shallow close vessel, and sunk into the top of a close heating stove, so as to form the cover over the fire-grate below, which is made to burn dross. The oil is fed into the retort by a pipe from a cistern above, fitted with a dip or oil trap; the gas is led off from the retort by a larger pipe down to a liquid trap at the bottom of the purifier, where, after escaping through the liquid, it passes up through perforated trays with a coating of lime and oak sawdust on them, from the top of which purifier it is finally led off by another pipe through the bottom of and up into the gasometer, which is of the dry collapsing class, and counterweighted by chains and pulleys to the pressure desired to be given to the gas, which is discharged through service-pipes. All otherwise in the usual manner.

6.—GOTTHEIL, R., Berlin, "*Improvements in the apparatus for measuring the heat of fluids passing through pipes.*" A communication. Provisional protection only obtained. Dated Jan. 1, 1874.

This invention relates to apparatus for indicating the heat of fluids passing through pipes.

In the course of the pipe is a circular casing opening tangentially to the pipe. In this casing is placed a wheel with vanes mounted on spindles, so that they can turn more or less obliquely to the plane of the wheel, these spindles being geared to a spiral spring made of two metals having different degrees of expansion when subjected to heat. The wheel is geared to a counter. When fluid passes along the pipe it impinges on the vanes and causes the wheel to rotate more or less rapidly according as the vanes are more or less inclined to the plane of rotation. The spiral spring and its gearing with the vanes is so adjusted that the greater the heat to which the instrument is subjected, the more the vanes are inclined by the action of the spring, and consequently the greater is the speed of rotation. The counter thus registers the product of the quantity of fluid passing along the pipe by its heat, or if the quantity be uniform it registers the number of units of heat transmitted along the pipe.

In a system of steam or water-heating pipes, by applying an apparatus at each end and comparing the indications, the quantity of heat given off may be ascertained.

25.—GOTTHEIL, R., Berlin, "*Improvements in motors to be worked by gas.*" A communication. Patent dated Jan. 2, 1874.

This invention relates to engines for obtaining motive power from the explosive combustion of gas and air. A cylinder is fitted with a working piston connected to a crank, and with a loose piston free to make an outstroke, but stopped by friction-clamps from making its instroke till these clamps are relieved by an eccentric. The cylinder has passages for the supply of gas and air and the issue of products of combustion between the pistons, and for the egress and ingress of air beyond the loose piston, with suitable slides and valves. The explosion of the gaseous mixture between the pistons forces both the working piston and the loose piston outwards, and the latter being held by the clamps the working piston is then forced by the atmospheric pressure inwards, and the loose piston being released also moves inwards, the approach of the two pistons discharging the products of combustion from the space between them. The fly-wheel causing the working piston to perform part of its outstroke, the gaseous mixture is drawn into the cylinder and ignited, and the action is repeated.

26.—FORBES, Rev. G. H., Broughton, Northamptonshire "*Improvements in the manufacture of gas for illuminating and heating purposes.*" Provisional protection only obtained. Dated Jan. 2, 1874.

This invention relates to a compound of the foul or refuse lime of gas-works or its equivalent with tar, pitch, or similar bituminous substance, or a combination of any two or more of them, and in some cases with chalk or limestone, or a combination of the two, with or without petroleum or other light hydrocarbon oil or spirit, and with or without animal or vegetable oil, or fat, or fatty matter, or a combination of any two or more of them.

In carrying this invention into practice the materials are thoroughly mixed, and then subjected to the process of distillation for the manufacture of gas.

28.—FORBES, Rev. G. H., Broughton, Northampton, "*A new or improved compound to be used as fuel.*" Patent dated Jan. 2, 1874.

This invention relates to a compound of the foul or refuse lime of gas-works, or of soap or chemical works, with coke, coal, or cinders, with or without certain other substances. The compound is intended to be used as fuel, and may be burnt either with or without coal or other fuel.

The foul lime is ground with coal, coal dust, coke, coke breeze, or a mixture of any of them (with sufficient water), in a mortar-mill, to reduce the whole to a stiff paste, which is afterwards formed into pieces of a suitable size. These are then dried, and are ready for use as fuel. Peat, wood, or any other vegetable substance, having been first reduced to fibre, dust, or pulp, is sometimes employed in addition to the above materials.

The proportion which the coke, coal, or cinders bears to the foul lime will vary considerably within certain limits. Sufficient foul lime must be employed in any case to unite the materials into a cohesive mass when the compound is dry, but the proportion of foul lime used should not in any case exceed one-half by weight, or 50 per cent. of the whole compound. When peat, &c., is used, the proportion will be one part by weight of the peat, &c., to two parts of the coke, &c. When a mixture of coke, &c., is used, any desired proportion may be employed. It is desirable to use the foul lime quite fresh from the purifiers.

The inventor also describes the use of tar, pitch, or similar bituminous substance, petroleum, or other light hydrocarbon oil or spirit, vegetable or animal oil, fat or fatty matters, in combination with his foul mixture.

34.—FORBES, Rev. G. H., Broughton, Northampton, "*Improvements in compounds designed for the manufacture of cements, plaster, or artificial stone; capable also of being used for artificial fuel.*" Patent dated Jan. 2, 1874.

This invention is a further development of letters patent, Nos. 1816 and 1832, A.D. 1873, which were granted to the present inventor. (See JOURNAL OF GAS LIGHTING, vol. xxiii., p 191.)

According to the present invention, the foul lime of gas-works, or its equivalent, is combined with coke, with or without chalk, limestone, tar, pitch, or similar bituminous substance, petroleum or other hydrocarbon oil or spirit, or a mixture of any of them.

The materials are mixed either by hand or by suitable machinery, and the compound, when sufficiently burned, is reduced to powder for use as cement, plaster, or artificial stone.

58.—BOUSFIELD, G. T., Sutton, Surrey, "*Improvements in rotary engines and pumps.*" A communication. Patent dated Jan. 5, 1874.

The objects of this invention are to obviate the defects incident to the circular movements of a piston or pistons in contact with heads fixed to the cylinder or case confining the fluid; also to work the steam with variable expansion; to pack the moving parts steam-tight; to sustain the pistons at their ends; to cause them to move properly; to prevent the leakage of steam from the cylinder; and to equalize the steam pressure upon the exteriors of rotary cylinder heads. To these ends the invention consists primarily of the combination of a fixed steam cylinder or case with one or more revolving pistons, and with cylinder heads which revolve with the piston or pistons, so that the unequal wear incident to the circular movement of the piston or pistons upon fixed heads is obviated. In place of arranging the cylinder stationary and the pistons and cylinder heads to revolve, the last two classes of instrumentalities may be stationary, and the cylinder may be arranged to revolve relatively to them, or the cylinder may be constructed to revolve in one direction and the other instrumentalities to revolve in an opposite direction. The invention consists further of certain other combinations and constructions.

64.—BENSON, M., Southampton Buildings, London, "*Improvements in the structure of furnaces and the apparatus connected therewith, for manufacturing iron and other metals by the use of hydrocarbon vapour or gas, combined with or without superheated steam, for heating purposes.*" A communication. Patent dated Jan. 6, 1874.

This improvement consists in constructing and combining mixing and combustion chambers with smelting and puddling furnaces, for using hydrocarbon vapour or gas combined with air or superheated steam as fuel for heating purposes.

70.—CLARK, A. M., Chancery Lane, London, "*Improved apparatus for regulating the pressure and friction of fluids.*" A communication. Patent dated Jan. 6, 1874.

This invention consists of a lift-valve, with adjustable or variable weights, and a diaphragm, arranged in a vertical pipe or case, having a removable cap or plug to afford easy access to the valve, in combination with the supply-pipe connecting with the fluid source and the delivery-pipe, for regulating, controlling, and limiting the pressure and friction of fluids. Also, the combination of two or more regulators and a special branch and cock with the supply-pipe and the delivery-pipe, for the discharge of different currents of different pressures from a constant source, or one current of constant or nearly constant pressure from a variable source by differently weighted valves.

77.—FOTTRELL, J., Dublin, "*Improvements in artificial stone pipes and tubes, and in the coating or lining thereof, to render them suitable for the conduit of alkaline liquids and acid products from chemical, manure, and gas-works, for sewage, saline liquids, and gas.*" Patent dated Jan. 7, 1874.

This invention relates to pipes and tubes of artificial stone, for which letters patent were obtained by the present inventor on the 20th of September, 1873, No. 3086 (see JOURNAL OF GAS LIGHTING, vol. xxiii. p. 917).

For the conduit of gas the interiors and ends are lined with a coating of silicate of soda, in a crude state, by painting such parts with a strong solution of the substance, and allowing it to dry slowly. Any other soluble silicate or aluminate may be employed, or a mixture of them.

For the conveyance of sewage, the tubes or pipes should be smoothly turned within, and when so arranged, should be coated internally with a thin but perfect layer of bitumen laid on hot and diluted with some oil, in order to lower the fusing point, so as to ensure complete union with the bitumen, agglutinating the particles of stone.

For acids, the mineral basis of the tubing, as described in patent No. 3086, above referred to, is altered, and the natural bituminous rock omitted from the composition, and one of the following substitutes employed for the crushed limestone:—(*a.*) Any sample of burnt clay or shale which is not acted upon by an acid; (*b.*) Sea or river sand free from matters soluble in muriatic acid; (*c.*) Crushed granite; (*d.*) Crushed flints, or other forms of silica, obtained by heating the flints to redness and quenching in water, when they are readily crushed and powdered; (*e.*) Earthy minerals unacted on by acids.

Tubes intended for saline or alkaline liquids should be made of burnt clay and bitumen; but pipes of the ordinary composition described in the former patent are likewise serviceable for the purpose.

84.—BROOKES, W. H., Birkenhead, "*Improvements in pumps.*" Patent dated Jan. 7, 1874.

In constructing a pump according to this invention, the ram or plunger is made hollow, and fitted with a valve and guard at its foot. This valve opens out from the interior of the ram or plunger, and forms the suction-valve. A suitable distance up the hollow ram there is a through slot, of length corresponding with, or rather more than, the stroke of the pump, and of width corresponding with the diameter of the suction-pipe which enters the barrel of the pump opposite the slot, and a suitable distance up the pump. The plunger, or

ram, is fitted below the through slot, with spring packing-rings, which are placed round the plunger or ram, and between the valve at the foot of the plunger or ram and the through slot. The delivery or discharge valve of the pump is fitted at the foot of the pump, and may be of any suitable form. The pump is provided with a packing gland for the ram, if found necessary, also with connecting-rod and suitable working gear.

112.—FARQUHAR, J. F. C., Long Acre, London, "*Improvements in gas-burners.*" Provisional protection only obtained. Dated Jan. 8, 1874.

This invention relates to ring burners of the Argand class. Two or more ring burners being arranged concentrically one within the other, are connected by separate tubes with a chamber beneath, into which the gas to supply all the rings is caused to enter. By screw-plugs or equivalent instruments within this chamber the supply of gas to the several rings is separately adjusted, so that each may receive its proper proportion. The passages by which air is supplied to the interior and exterior of each flame are so adjusted that everywhere the flames are in contact with air flowing at the same or approximately the same speed.

121.—BENSON, M., Southampton Buildings, London, "*Improvements in pump-valves.*" A communication. Patent dated Jan. 9, 1874.

This improvement consists in constructing pump-valves, of elastic material, so as to permit the passage of substances through the valves equal in size to the shape or area of the valve opening, without choking or preventing the proper working of the valves at all times.

138.—JENSEN, P., Chancery Lane, London, "*New or improved modes of, and means and materials for the manufacture of vats, gasholders, and other vessels.*" A communication. Patent dated Jan. 10, 1874.

The object of this invention is the production of vats, gasholders, and other cisterns or vessels for manufacturing and storing, and other purposes, in a stronger and better way than has heretofore been done, and so as in some cases to resist the influence of ammonia or other solutions or materials kept or stored in such vessels. For this purpose the vessels are built or composed of a material such as artificial stone produced from artificial material, of artificial sandstone that has or may be produced by artificial means in combination or connexion with chemical appliances or mixtures, or they may be of cement alone, or of concrete or fire-clay glazed or not glazed, or other like materials, which are formed in blocks joined by means of tennons, dowels, feather and groove, or dovetails cemented together; or, in some cases, the vessel is made in one solid piece.

In order to resist the internal pressure the vessels are hooped, or they may, in some cases, be built or sunk into clay, concrete, or other materials, and in such cases they may be formed with dovetail-shaped or other ribs externally.

153.—FOULIS, W., Glasgow, "*New or improved machinery or apparatus for charging retorts.*" Patent dated Jan. 12, 1874.

This invention consists of a horizontal framing upon which the charging scoop with its attachments are carried. Beneath the horizontal framing one or two drums are situated whose axis or axes (as the case may be) is or are at right angles to the length of the framing. The scoop is attached to a circular block of metal, and carried in bearings, in which it is capable of rotating. Chains are attached to the winding drum or drums, and are coiled round it or them in opposite directions, so that whilst one chain is being unwound according to the direction in which the drum or drums is or are rotated, the other chain is being wound up. The other ends of the chains are attached to the circular block of metal which carries the scoop, two grooves being formed therein, each to receive the termination of one of the chains which are wound round it in opposite directions, and carrier pulleys are placed at the ends of the framing round which the chains pass. By means of this arrangement accordingly as the winding drum or drums is or are rotated in a right or left hand direction, so the scoop is moved to and from the retort. When arrived at the end of its inward stroke a stop is released, which permits the further action of the winding drum or drums on the chain which has pulled the scoop forwards to rotate the scoop sufficiently to deposit its charge in the retort, after which the winding drum or drums is or are rotated in the opposite direction, thereby drawing back the scoop and turning it in position to receive another charge. The winding drum or drums is or are actuated by a rack and pinion or bevel gearing operated by hand, steam, or hydraulic power. In place of using a winding drum or drums, a horizontal hydraulic cylinder may be provided for actuating the chains, the other parts of the apparatus being arranged as described.

This apparatus has been already fully described and illustrated. (See JOURNAL OF GAS LIGHTING, vol. xxiii., p. 546.)

160.—SCHMERSAHL, A. E., Manchester, "*Improvements in treating sewage water and other foul liquids.*" Provisional protection only obtained. Dated Jan. 12, 1874.

The features of novelty in this invention consist in precipitating all the useful matters in solution or suspension in foul liquids by means of a mixture of acids, say two parts of sulphuric acid mixed with water, and one part of hydrochloric acid, which is added thereto in sufficient quantity to decompose the matters, when milk lime is added to neutralize the liquid, and the precipitate immediately falls, leaving the effluent water pure and odourless.

167.—HEARSON, C. E., Bedford Row, London, "*Improvements in Argand burners for burning coal gas or other illuminating gas, and animal, vegetable, and mineral oils.*" Patent dated Jan. 13, 1874.

This invention relates to circular or Argand burners for burning coal gas or other illuminating gas, or animal, vegetable, or mineral oils.

The objects of this invention are to effect a more perfect combustion of the oil or gas used, and to obtain a steadier and larger flame than heretofore from a given quantity of oil or gas. It also admits of Argand burners considerably larger than those ordinarily made being used with beneficial results.

For these purposes the interior of the inner tube of the burner is divided by means of vertical diaphragms, ribs, or partitions, into vertical air shafts or passages, the lower ends of which communicate with the external atmosphere, and there is sometimes fixed upon the burner a dome or cap of the form ordinarily used with Argand burners. These arrangements prevent the lateral motion to which the air which ascends through ordinary Argand burners is liable.

The diaphragms or partitions are so arranged as to meet or intersect one another at various angles, or to project radially from the inner circumference of the inner tube towards the centre. Or the diaphragms or partitions (which may be either flat or curved in transverse section) may be so arranged as to form vertical air-shafts, or tubes having polygonal or curved forms in transverse section, and may be either of the same length as or slightly longer or shorter than the inner tube, their shape, size, and arrangement being susceptible of various modifications.

In addition to the diapbragms arranged as described, the annular space between the outer tube of the burner and the dome, or cap, is sometimes divided by means of vertical ribs or diaphragms, and in cases were several burners are arranged concentrically the annular spaces between the burners are also divided in the same manner.

168—ABEL, C. D., Southampton Buildings, London, "*Improvements in electric tell-tales for pressure-gauges.*" A communication. Provisional protection only obtained. Dated Jan. 13, 1874.

This invention relates to an electric tell-tale, whereby when the index of a pressure-gauge attains a predetermined point, an electric bell at a distance is caused to sound, by bringing into contact two springs in the electric circuit of a battery and the bell. The springs are mounted on an adjustable framing, so that they can be set for contact to be made when the index of the gauge reaches any desired point in its dial. The bell apparatus may be of any known construction, but is preferably made to consist of an electro-magnet composed of wires within a coil, bent back so as to present three branches, provided with an armature composed of a number of thin iron plates secured to a vibrating plate which works the bell-hammer, and on which is a contact-plate that can be shifted so as to present a fresh contact surface.

205—NEWTON, A. V., Chancery Lane, London, "*Improvements in the mode of and apparatus for filtering, rectifying, or clarifying liquids and gases.*" A communication. Patent dated Jan. 15, 1874.

This invention consists in supplying a liquid or gas into a filtering-chamber contained in an air-tight vessel, and causing the same while under pressure to pursue a centripetal course, and to enter a receiver located within the body of the filtering material contained in the filtering-chamber.

207.—HUERNE, P., San Francisco, California, "*An improved self-cleaning water filter and connexions, whereby water may be filtered for household purposes, and stored in quantity, so as to be used at pleasure.*" Patent dated Jan. 16, 1874.

This invention relates to an improved water filter, to be attached to water faucets in buildings, for the purpose of filtering the water which is used for drinking and other purposes, and consists of a reversible hollow globe or oblong shell, provided with inlet and outlet tubes in combination with a corresponding filtering stone having a central hole or passage, and short pipes and tubes. The hollow globe or shell has its filtering stone in combination with pipes and a tank, the pipes being connected by another pipe provided with a cock, by which the operation of the filter may be reversed for cleaning the filter with filtered water. There is also a reversible globe, or ovoid filter, provided with a corresponding interior filtering stone, made reverisible, for the purpose of cleaning the stone.

219.—GRIFFIN, J. T., Upper Thames Street, London, "*Improvements in the construction of wrenches for turning pipes, bars, and other similar articles.*" A communication. Patent dated Jan 16, 1874.

This invention consists in fitting to the curved extension-piece of the wrench a curved dog claw with a serrated face, which, with other serrations on the face of the extension-piece, form the jaws or teeth for gripping the article to be turned, the bite taking place while the tool is moved in one direction only.

226.—LAMONT, J., Glasgow, "*Improvements in water-closets, and in service-cisterns for these and other purposes.*" Provisional protection only obtained. Dated Jan. 17, 1874.

This invention consists of a double-chambered cistern or chest, the one containing the water, fitted with the usual service ball float-valve and overflow-pipe, to maintain the water in it at a normal level; the other chamber being dry in its normal state, but having a tilting scoop-shaped water-measuring vessel mounted in it on a pivot-screw pin at one side, and on a small bent arm tube passing through a fluid-tight stuffing-box at the other, to lead the water from the supply compartment into the tilting-basin, when it and its filling bent tube are kept horizontal by a counterbalance weight. This measuring vessel is tilted by an arm and lever at one side and a wire or other equivalant carried down to the seat of the closet so as to be pulled by hand, or by the automatic action of the seat; all so as to raise the open mouth of the filling bent tube above the water in the cistern, and to empty the contents of the tilting vessel over its scoop into its containing dry vessel, which lets the whole quickly down through the large service-pipe fitted to its bottom, into the basin of the closet below, so as to flush it in the ordinary manner. So long as the measuring vessel is held in its tilted position, no more water can be supplied, and when let go, its balance-weight brings it and its filling-tube to the normal position, so as to fill it in a reasonable time, depending on the diameter of the tube, ready for the next action and flushing of the closet.

231.—FORBES, Rev. G. H., Broughton, Northampton, "*Improvements in the purification of gas and the manufacture of artificial fuel.*" Dated Jan. 17, 1874. (This invention is void by reason of the patentee having neglected to file a specification in pursuance of the conditions of the letters patent.)

This invention relates to a new or improved compound for the purification of gas, and which, after being applied to that purpose, may be used for the manufacture of artificial fuel.

In carrying it into practice, quicklime, chalk, or limestone, is combined with tar or similar bituminous substance, in such a manner as to form a powder, which is used instead of, or in addition to, lime in the purifier. After its removal from the purifier the compound is capable of being used for making artificial fuel. If necessary, it may be combined with a further quantity of tar, and, when desired, formed into blocks. After being burnt it may be, when necessary, mixed with quicklime and used again in the purification of gas.

It is preferred that the above substances should be combined in about the proportion of from five to seven pounds of the tar, &c., to 1 cwt. of the chalk, limestone, or lime. These proportions are found to give very advantageous results, but may be varied within certain limits, if desirable.

232.—FORBES, Rev. G. H., Broughton, Northampton, "*Improvements in the purification of gas.*" Patent dated Jan. 17, 1874.

This invention relates to a new method of utilizing the compounds forming the subject of former inventions for which letters patent Nos. 1816, 1832, and 3783, A.D. 1873, were granted to the present inventor.

The former inventions relate to compounds of the foul lime of gas-works or of soap and chemical works, and tar or pitch, or similar bituminous substance, and in some cases of chalk or limestone, for the purpose of manufacturing cement, plaster, and artificial stone, capable also of being used for artificial fuel.

According to the present invention, the compounds are used for fuel and for the manufacture of a material suitable for purifying gas. The compound is burnt, and afterwards the residue is used, with or without quicklime, for purifying gas, instead of, or in addition to, the lime ordinarily used for that purpose.

The manner of carrying this invention into practice is fully described in the former patents, the only difference being that the residue of the combustion is applied to the purpose above described, instead of to the making of cement, plaster, or artificial stone. Water is added to slake the material before using it in the purifier.

APPLICATIONS FOR LETTERS PATENT.

3047.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improvements in apparatus for compressing gaseous fluids." A communication. Sept. 4, 1874.

3058.—LAKE, W. R., Southampton Buildings, London, "Improvements in portable hydrogen and carburetted hydrogen gas apparatus." A communication. Sept. 5, 1874.

3069.—DRUCE, F. H., Spitalfields, London, "Improvements in double-acting apparatus or machinery to be used for discharging or ejecting water and other liquids." Sept. 7, 1874.

3070.—WHITWORTH, J., Royton, Lancs, "Improvements in the construction of lamps for lighting gas." Sept. 7, 1874.

3073.—CLARK, W., Chancery Lane, London, "Improved apparatus for testing mineral oils and other inflammable liquids." A communication. Sept. 7, 1874.

3082.—COOPER, W., Southampton, Hants, "An improved rotary steam-engine and pump." Sept. 8, 1874.

3086.—CLARK, A. M., Chancery Lane, London, "Improvements in lamps." A communication. Sept. 8, 1874.

3087.—WILKES, J. P., Trinity Square, Great Tower Street, London, and AUNIER, A., Ladbroke Grove Road, Notting Hill, London, "Improvements

in the mode of and apparatus for the extraction and treatment of sulphur." Sept. 9, 1874.

3095.—Rowbottom, J., Halifax, Yorks, "Improvements in retorts, and in means or apparatus for charging and discharging the same." Sept. 9, 1874.

3101.—Atkins, T., St. Albans, Herts, "Improvements in stoppers, valves, and apparatus for filling and discharging bottles, vessels, store-chambers, mains, or other holders used for containing fluids, liquids, gases, or vapours." Sept. 10, 1874.

3108.—Bray, H., Manchester, "Improvements in the manufacture of gas for illuminating and heating purposes." Sept. 10, 1874.

GRANTS OF PROVISIONAL PROTECTION.

2878.—Aronson, J. N., Portland Place, London, "Improvements in lamps or lighting apparatus." Aug. 21, 1874.

2880.—Houghton, J., Salford, Lancs, "Improvements in the construction of taps or valves." Aug. 21, 1874.

2894.—Hulett, D., High Holborn, London, "Improvements in street and other lamps or lanterns, and in apparatus for regulating the supply of gas thereto and to other gas-burners." Aug. 24, 1874.

2901.—Knowelden, J., Bermondsey, London, "Improvements in steam, water, or other fluid engines." Aug. 25, 1874.

2911.—Ley, W., and Shearer, G., Liverpool, "An improved tube-plug or stopper." Aug. 26, 1874.

2920.—Ramsden, J. C., Lightcliffe, Halifax, Yorks, "Improvements in apparatus to be employed in the manufacture of gas for heating or illuminating purposes." Aug. 26, 1874.

NOTICES TO PROCEED.

1490.—Lee, J. W., Cambridge, "Improvements in the manufacture and working of direct-acting pumps." April 29, 1874.

1530.—Brine, G. J., and Allen, T., Southsea, Hants, "Improved cisterns or cistern apparatus for discharging or flushing at intervals, and preventing waste of water." May 1, 1874.

1567.—Lowne, R. M., Finchley, Middlesex, "Improvements in anemometers and other fluid-meters." May 4, 1874.

1711.—Beale, J., East Greenwich, Kent, "An improved engine to be used for pumping gases, air, or fluids." May 14, 1874.

2071.—Rumpff, C., New York, U.S.A., "A new or improved dry process of oxidizing 'anthracene,' and improvements in the manufacture of dyes and other colouring matters from the product so obtained." June 15, 1874.

2526.—Straten, E. V., Antwerp, Belgium, "Improvements in apparatus for the combustion of air and gas for heating purposes." July 18, 1874.

2815.—Smith, W. H., Edgbaston, Birmingham, "Improvements in treating metals and their alloys by subjecting them to the action of liquids, gases, vapours, and in apparatus employed therein, and for the manufacture of gas for illuminating and heating purposes." Aug. 15, 1874.

2822.—Forbes, Rev. G. H., Broughton, Northampton, "Improvements in the manufacture of cement." Aug. 15, 1874.

2824.—Johnson, S. H., F.C.S., Stratford, Essex, "Improvements in cocks or valves." Aug. 15, 1874.

2878.—Aronson, J. N., Portland Place, London, "Improvements in lamps or lighting apparatus." Aug. 21, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

768.—Landau, M. I., St. Mary Axe, London, "Improvements in miners safety-lamps and in other lamps, also in burners, and in applying lamps for various purposes, and in apparatus for supplying and regulating gas, and for ventilating." March 3, 1874.

813.—Goold, G., Birmingham, "Improvements in cocks or valves for regulating the flow of liquids." March 5, 1874.

839.—Willoughby, J., Plymouth, Southwell, W. A., and Briggs, T. J., Broad Street, London, and Willoughby, S., Plymouth, "Improvements in apparatus for distilling tar and the products thereof." March 7, 1874.

840.—Cook, H. W., Brompton, London, "Improved apparatus for pumping or forcing water, air, gas, or other liquids or fluids." March 7, 1874.

874.—Tandy, G. G., Penge, Surrey, "Improvements applicable to street and signal lamps." March 10, 1874.

935.—Holland, H., Birmingham, "New or improved apparatus for charging atmospheric air with the vapour of hydrocarbon liquid." March 14, 1874.

939.—Teulon, G. A., Hampstead, London, "Improvements in cylinder-engines and pumps." March 16, 1874.

949.—George, R., Worcester, "Improvements in taps, valves, and stop-cocks." March 17, 1874.

986.—Burden, J., Birmingham, "Improvements in steam-gauges, pressure-gauges, and vacuum-gauges." March 20, 1874.

1066.—Keith, J., Arbroath, N.B., "Improvements in the manufacture of illuminating gas and in the apparatus employed therefor." March 27, 1874.

1079.—Nuttall, F. D., St. Helen's, Lancs, "Improvements applicable to regenerative and other gas-furnaces." March 28, 1874.

1189.—Pattison, J., Naples, Italy, "Improvements in automatic hydraulic apparatus for working pumps and compressing air." April 4, 1874.

1260.—Moule, Rev. H., Fordington, Dorset, "Improvements in the production and manufacture of gas." April 11, 1874.

1338.—Wanchope, A., Niddrie, Edinburgh, and Cowan, J., Sandymount, Dublin, "Improvements in the manufacture of gas." April 17, 1874.

1733.—Pontifex, E. A., Shoe Lane, London, "Improvements in apparatus to be used in drawing off water and other liquors, and in measuring the quantities drawn off." May 15, 1874.

2009.—Casthelaz, J., Crumpsall Vale, near Manchester, "Improvements in the preparation of products of aniline and matters from which aniline is or may be derived, suitable to be used in dyeing and printing, and in the preparation of colouring matters." June 10, 1874.

2126.—Pearson, T., Kennington Cross, Surrey, "Improvements in vehicles for the distribution of liquids and in appliances connected therewith." June 18, 1874.

2197.—Newton, H. E., Chancery Lane, London, "Improvements in gas-burners." A communication. June 24, 1874.

2299.—Fowler, A. M., Salford, Lancs, "Improvements in the construction of privies and water-closets." July 2, 1874.

2318.—Kunstadter, J. J., Camomile Street, London, "Improvements of apparatus for causing the flow of liquids, and also in apparatus to obtain motive power from the flow of liquids." July 3, 1874.

Notes and Queries.

B. A. asks: "Will some correspondent kindly furnish me with equations of the chemica processes in Mr. Patterson's method of purification—namely, first, taking out the CO_2, and then the sulphuretted hydrogen and carbonic disulphide?"

A Clydeside Manager will esteem it a favour if any reader of the Journal will inform him if revenue for spent material is generally deducted from total cost of purifying materials and labour, when stating cost of purification per 1000 cubic feet. Also if any manager has compared a year's (or other period's) working with a proportion of shale tar oil—M'Kenzie's compound, or other mixture—with a like period's working of his ordinary working coals; if so, how much less gas was unaccounted for carbonising latter than when using mixture.

S. A.—Will some of the chemical readers of the Journal inform the writer how the per centage of ammonia is estimated in sulphate of ammonia, and also in the spent residuum liquor of that manufacture?

Share List,
OF
Metropolitan Gas and Water Companies.

(*Corrected by Mr. F. N. Golding, Sun Court, Cornhill, from the latest Stock Exchange Quotations.*)

Number of Shares issued.	Amount per share.	Name.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	14 — 16
5000	20	Bahia (Limited)	20 0 0	3 0 0	10 — 11
1000	20	Do., preference	20 0 0	10 0 0	25 — 27
1000	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
1500	20	Do., perpetual preference	20 0 0	7 10 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	6 15 0	6¼ — 6⅝
10000	5	Do., fourth issue	4 0 0	6 15 0	1—1¼ pm.
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	34 — 36
7500	20	Cagliari (Limited)	20 0 0	7 0 0	14 — 16
180000	10	*Chartered* A ordinary	10 0 0	10 0 0	15½— 16¼
25000	10	Do. A, 5 per cent. preference	10 0 0	5 0 0	15 — 15½
20000	10	Do. A, 5 per cent. do., 2nd issue	10 0 0	5 0 0	15 — 15½
30000	10	Do. A, 5 per cent. do., 3rd issue	10 0 0	5 0 0	4¼—4½ pm.
10000	10	Do. B, 4 per cent. maximum	10 0 0	4 0 0	7 — 7½
20000	10	Do. C, 10 per cent. preference	10 0 0	10 0 0	20½— 21½
12000	25	Do. D, 10 per cent. preference	25 0 0	10 0 0	51 — 53
44987*l.*	Stk.	*Commercial*	100 0 0	10 0 0	171 —174
20000	20	Continental Union	20 0 0	8 0 0	19½— 20½
20000	20	Do., new	12 10 0	8 0 0	1 dis.—par
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	24 — 26
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16½— 17
5000	10	Do., preference	10 0 0	6 0 0	11¼— 12½
10000	10	Do., ordinary	10 0 0	7 0 0	12½— 13½
2500	10	Do., converted	2 0 0	10 0 0	1½— 2 pm.
2500	10	Do., converted	2 0 0	7 0 0	1 —1½ pm.
23406	10	European (Limited)	10 0 0	10 0 0	14 — 15
12000	10	Do., new shares	7 10 0	10 0 0	2½—2⅝ pm.
	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	10 0 0	1½—2 pm.
4054	10	Foreign and Colonial (Limited)	10 0 0	..	9 — 10
5800	10	Hong Kong (Limited)	10 0 0	10 0 0	14 — 15
1560000	100	*Imperial*	100 0 0	10 0 0	170 —173
78000	12½	Do., new shares	12 10 0	7 0 0	15⅞—16¼ xd
1300	100	Do., bonds	£100	10 0 0	197 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Frankfort-on-Maine, Haarlem, Stolberg, and Vienna.)	45 15 0	9 2 6	58 — 60
3000	40	*Independent*	40 0 0	10 0 0	66 — 68
3000	10	Do.	10 0 0	3 0 0	8½— 9½
3000	20	Do.	20 0 0	7 10 0	26 — 27
4500	10	Do., D	3 0 0	10 0 0	3 — 4 pm.
378350*l.*	Stk.	*London*	100 0 0	10 0 0	170 —172
150000*l.*	Stk.	Do., 1st preference	100 0 0	6 0 0	118 —121
14450	Stk.	Do., 2nd preference	100 0 0	6 0 0	
4350	Stk.	Do., 3rd preference	100 0 0	6 0 0	
7622	25	Do., A shares	12 10 0	6 0 0	
268035	All	Do., Debenture stock	100 0 0	5*l.* & 6*l.*	
15000	5	Malta and Mediterranean (Limited)	5 0 0	3 0 0	2 — 2½
6000	5	Do., preference	5 0 0	7 0 0	5 — 5½
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2 — 2⅛
25000	20	Monte Video (Limited)	20 0 0	..	21¼— 22½
8000	10	Nictheroy, Brazil (Limited)	10 0 0	..	
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	7 — 7¼
50000	5	Do., new shares	2 10 0	9 0 0	¾—1¼ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2½
17500	10	Parà (Limited)	10 0 0	7 0 0	6 — 8
27000	20	*Phœnix*	20 0 0	10 0 0	35 — 36
360000*l.*	100	Do., new	55 0 0	7 10 0	71 — 73
144000*l.*	Stk.	Do.	100 0 0	5 0 0	93 — 95
5000	20	*Ratcliff*	20 0 0	10 0 0	24 — 26
36000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	31 — 33
7359	5	Singapore (Limited)	5 0 0	7 10 0	4½— 5
2000	5	Do., preference	5 0 0	7 10 0	5½— 6
1500	32½	Shanghai	32 10 0	12 0 0	30 — 32
4000	50	*South Metropolitan*	50 0 0	10 0 0	80 — 83
4000	12½	Do.	12 10 0	10 0 0	21 — 21½
20000	12½	Do., new shares	5 0 0	10 0 0	6½— 6⅞ pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16½— 16⅞
10000	10	Do., new	7 0 0	10 0 0	5 — 6 pm.
9000	4	United General (Limerick)	4 0 0	2 10 0	2 — 2½
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	14 — 15
1500	10	Do.	10 0 0	7 10 0	11 — 12
2957	10	Do.	10 0 0	7 0 0	
993	10	Do.	3 0 0	7 0 0	
16000	5	*West Ham*	5 0 0	10 0 0	7⅞— 8
10000	5	Do., new shares	2 10 0	10 0 0	3 — 4
		WATER COMPANIES.			
12000	100	Chelsea	100 0 0	6 0 0	124 —126
1800000	100	East London	100 0 0	6 0 0	135 —137
8000	50	Grand Junction	50 0 0	7 0 0	77 — 79
5840	25	Do., ¼ shares	25 0 0	7 0 0	36¾— 37¼
2160	25	Do., new do.; maximum dividend, 7½ per cent.	25 0 0	7 0 0	31 — 33
4396	100	Kent	100 0 0	6 10 0	128 —130
5339	100	Lambeth	100 0 0	6 5 0	127 —129
1161	100	Do.	20 0 0	6 5 0	
442	100	New River	100 0 0	8 0 0	170 —180
4475	100	Do.	30 0 0	8 0 0	50 — 55
400000	100	Do., debenture stock, 4 per cent.	100 0 0	4 0 0	97 — 99
3036	100	Southwark and Vauxhall	100 0 0	5 5 0	105 —107
1290	100	Do., preference stock	100 0 0	5 0 0	101 —103
	100	Do., D shares	100 0 0	5 5 0	104 —106
		Do.	..	4 10 0	
	10♦	Do., new ordinary	..	4 10 0	
1000	100	Do., new ordinary, No. 1	40 0 0	4 10 0	
12172	61	West Middlesex	61 0 0	£6 per sh.	125 —130

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

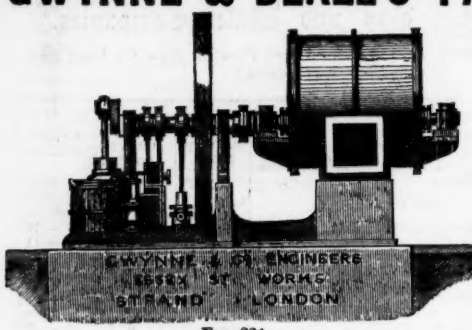

FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

Mr. BEALE,

The oldest Maker, Inventor and Patentee of

GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

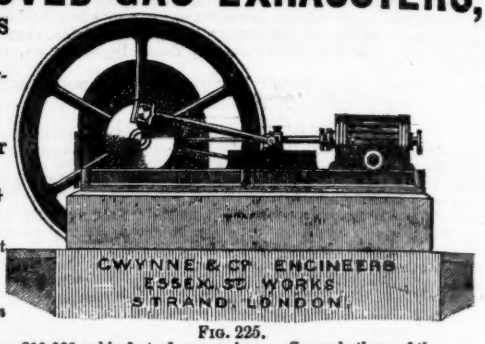

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES, CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

WANTED, by the Advertiser, aged 22, a situation as CLERK, or any place of trust, with a Gas Company. Good references.

Address LEX, care of G. Briffett, 3, Union Street, Baneswell, Newport, MON.

WANTED, a Yardman for small Gas-Works. Must be able to read and write. Wages to commence at 21s. per week.

Apply, in own handwriting, to K. Q. X., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING FOREMAN required for a country Gas-Work. Must have a thorough knowledge of gas-making in all its branches, with use of clay retorts, exhausters, &c.; also gas-fitting, main and service laying, &c. Undeniable references as to character and efficiency indispensable. State what wages required.

Address WORKING FOREMAN, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CANTERBURY GAS AND WATER COMPANY.

WANTED, an out-door Inspector. He will be required to act as Index Taker, and must have a practical knowledge of gas and water fitting, main-laying, &c. A residence with coals and gas are provided.

Applications, stating salary required, to be sent to me at the Company's Offices, Castle Street, Canterbury.

By order,

Sept. 12, 1874. JAMES BURCH, Secretary.

WANTED, an experienced Foreman for a Gas-Work where the annual make of gas is about 50 millions. He must thoroughly understand the working of fire-clay retorts, exhausters, &c., and the duties required in a Gas-Work. None need apply unless they have been in a similar situation before. He will require to be a married man. There is a good house, with coals, gas, &c.

Testimonials as to character, ability, and wages required, to be addressed to F. H., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MANAGER WANTED.

WANTED immediately, a qualified MANAGER (single man preferred) for the Gas-Works in Panama. He must thoroughly understand the manufacture and distribution of gas in all its branches, and have a practical knowledge of gas-fitting. Salary £300 per annum, with house, and a commission on the fittings. Security required.

Applications, with testimonials as to qualifications and character, to be addressed to the SECRETARY, 11, Clement's Lane, LONDON, E.C.

THE Advertiser is desirous of Contracting for the erection of Gas or Water Works, Roofs, Tanks, &c., at home or abroad. He can give unexceptionable references as to experience and ability, and is prepared with security for the due performance of any contract he may undertake. Has been a great number of years abroad engaged at both erecting and managing Gas and Water Works.

Address SUBCONTRACTOR, 3, Broadway, London Fields, HACKNEY.

TO GAS COMPANIES.

THE Advertiser (a Gas Manager who will shortly be disengaged) is desirous of a re-engagement as MANAGER, or Manager and Secretary. Has had 20 years practical experience, home and foreign, and is thoroughly acquainted with the most modern and approved appliances introduced in the manufacture, purification, and distribution of gas. Aged 36. Active and energetic. Satisfactory references, &c. Would not object to go abroad for an English Company.

Address D., care of Mr. Batley, 13A, Great George Street, WESTMINSTER.

ADVANTAGES OF GAS FOR COOKING AND HEATING,

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MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their gas consumers.

Specimen Copy by post 4d., direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

WANTED, a steady, industrious Man, who thoroughly understands the manufacture of gas, as STOKER, &c., for a small Gas-Work where another stoker is kept. Wages 24s. per week.

Apply to G. S. FURNIVALL, Gas-Works, Bradley Green, near CONGLETON.

METER MAKERS.

A GENTLEMAN of practical experience is open to arrange with any firm to SELL for them in certain districts.

Address METER, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

OFFERS Wanted for six £100 Shares in the Gas-Meter Company, Limited.

Address X. Y. Z., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SMALL Gas-Works to be Let on Lease, with facilities for greatly extending the consumption of gas.

Apply to A. C. FRASER, Consulting Engineer, 16, ST. SWITHIN'S LANE, E.C.

GAS APPARATUS MAKERS.

ANY Firm wishing to Extend and Increase their TRADE, may do so by arranging with a Gas Engineer, who has a good and valuable connexion with Gas Companies, Shippers, &c., as Agent or otherwise.

Address ENGINEER, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO BE SOLD immediately, Gas-Works in good order, and within 10 miles of London. Suitable for a mansion. Comprising retorts, condenser, washer, purifier, centre-valve, and gasholder. The above are on a gentleman's estate, and must be cleared within 14 days after the sale.

For further particulars, apply to Mr. ALFRED LASS, 60, Cornhill, LONDON, E.C.

TO PIPE-LAYERS.

THE Bracknell Gas Company, Limited, invite TENDERS for providing and laying about 842 yards of 2-in. SOCKET-PIPES, with syphons, branches, &c., complete.

Particulars may be obtained from the undersigned. Tenders to be delivered by the 23rd of September inst.

F. W. HUNTON, Secretary.

Bracknell, Berks, Sept. 3, 1874.

STATION-METER.

THE Directors of the Hampton Court Gas Company have for SALE a good STATION-METER, capable of passing 6000 cubic feet per hour, nuts, 6-in. connexions, including inlet, outlet, and bye-pass valves, all complete and in good working order. Discontinued in consequence of being too small.

Apply to EDWARD PRICE, Engineer, the Works, HAMPTON WICK.

THE Stevenage Gas and Coke Company are desirous of receiving TENDERS for the erection of a new GASHOLDER, to contain 5000 cubic feet, and the making a Brick Tank for the same, and adding the necessary inlet and outlet pipes and connexions.

Communications to be addressed to the SECRETARY, Gas and Coke Company, STEVENAGE.

DRONFIELD GAS-WORKS.

TO IRONFOUNDERS AND CONTRACTORS.

THE Directors of the Dronfield Gas Company are prepared to receive TENDERS for the supply of a new GASHOLDER, 60 ft. diameter 18 ft. deep, with columns, &c.; four Purifiers, 8 ft. by 8 ft. by 4 ft. deep, with centre-valve and connecting-pipes; a Condenser, with 32 8-in. pipes, and all the necessary pipes from the retorts to the outlet-pipe of Gasholder, according to plans and specifications to be seen at the works.

Any further information can be obtained by applying to Mr. Jonathan Wilkinson, Grimesthorpe.

Tenders to be sent in, addressed to the Secretary, on or before the 29th day of September.

The Directors do not bind themselves to accept the lowest or any tender.

H. SINGLETON, Secretary.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the London Tavern, Bishopsgate Street, in the City of London, on MONDAY, the 5th day of October next, at Two o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts of the Company for the half year ended the 30th of June last, and to declare a Dividend for the same period.

By order of the Board,

GEORGE LIVESEY, Secretary and Engineer.

589, Old Kent Road, S.E., Sept. 12, 1874.

The Transfer Books of the Company will be closed from the 21st of September to the 5th of October.

WIDNES GAS-WORKS EXTENSION.

THE Gas-Works Committee of the Widnes Local Board are prepared to receive TENDERS for the excavation, brickwork, &c., necessary in the construction of a GASHOLDER-TANK, 106 ft. 6 in. in diameter, and 26 ft. deep.

The Drawings and Specification may be seen daily, "Saturdays excepted," between the hours of Ten and Five, on application to the Engineer at the Gas-Works, of whom duplicate bills of quantities may be had on payment of one guinea.

Tenders to be addressed to the Chairman of the Gas-Works Committee, endorsed "Tender for Gasholder-Tank," and delivered at the Gas-Works, Widnes, not later than the 2nd of October next.

The Board do not bind themselves to accept the lowest or any tender. T. A. DREW,

Gas-Works, Widnes, Engineer and Manager.

Sept., 1874.

CANNEL.

THE West Yorkshire Iron and Coal Company, Limited, will be glad to receive FORMS for TENDERS from Gas Companies and others requiring a supply of CANNEL.

Address, 72, Wellington Street, LEEDS.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHEIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHEIMES, Foundry and Brass Works, ROTHERHAM.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

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The scope of this work is apparent from its title. The First Edition, published a year or two ago, was eagerly sought for, and has been now for some time out of print. The favourable reception accorded to it sufficiently proved that it supplied a generally acknowledged want in the profession. The work has undergone careful revision; much new matter has been added; and the New Edition is published in fcap. 8vo., morocco, gilt.

"This may be fairly described as among the most useful manuals of its class."—*Iron.*

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"The new edition is published in a small octavo form, which makes it a handy book, either for the pocket or the desk."—JOURNAL OF GAS LIGHTING.

"An excellent little book."—*Mr. R. H. Patterson (late Gas Referee) in the* JOURNAL OF GAS LIGHTING, *April* 28, 1874.

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CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.

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And every Description of Gas Apparatus.

GAS, STEAM, AND WATER FITTINGS.

THE THAMES BANK IRON COMPANY,

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SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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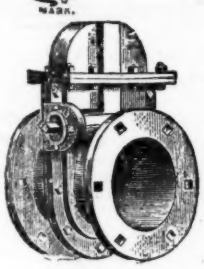

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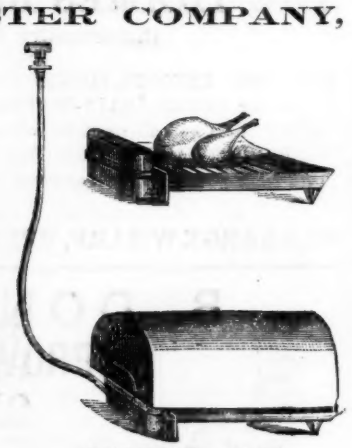
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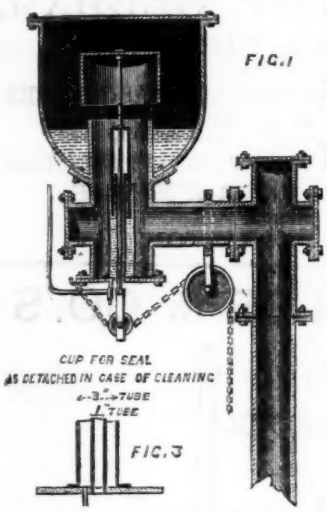
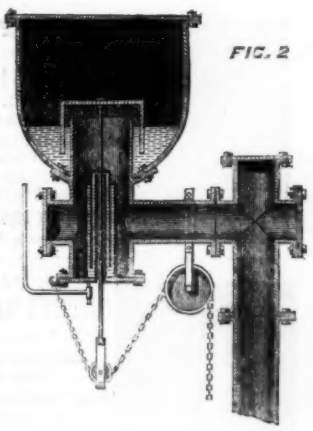


Fig. 1 shows the Seal when at work; the cap or bonnet covering the stand-pipe being raised by a chain, and allowing a free passage into the Hydraulic Main.

Fig. 2 shows the Seal when at rest; the cap or bonnet being lowered over the stand-pipe, and sealing itself in the fluid in the Hydraulic Main.

Fig. 3 shows a Seal for the protection of the rod used to raise or lower the cap or bonnet, which can be easily detached if required.

The bent tube which passes into this cup is to fill it, when first erected; after which, it will supply itself.



Some of the advantages derived by the use of this Seal are as follows:—

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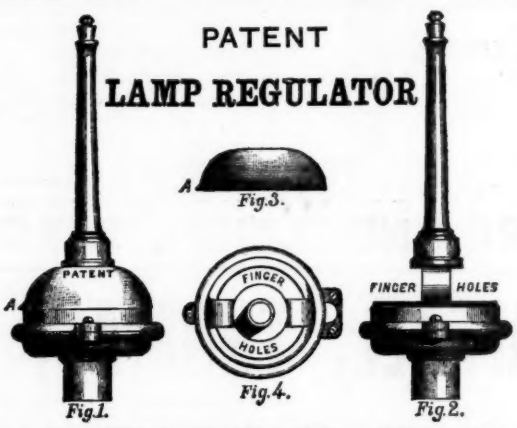

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"A few years ago, a simple form of Gas Regulator for Street Lamps was introduced, I do not know by whom, and various forms of it, and improvements on it, have been made by many practical gas engineers. Of all the modifications of the instrument, the best in my opinion is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his Lamp Regulators are so superior that they are likely to supplant all others. Already about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town. The saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. One of the great advantages of Mr. Peebles's apparatus over all others is that it can be regulated while the gas is burning."
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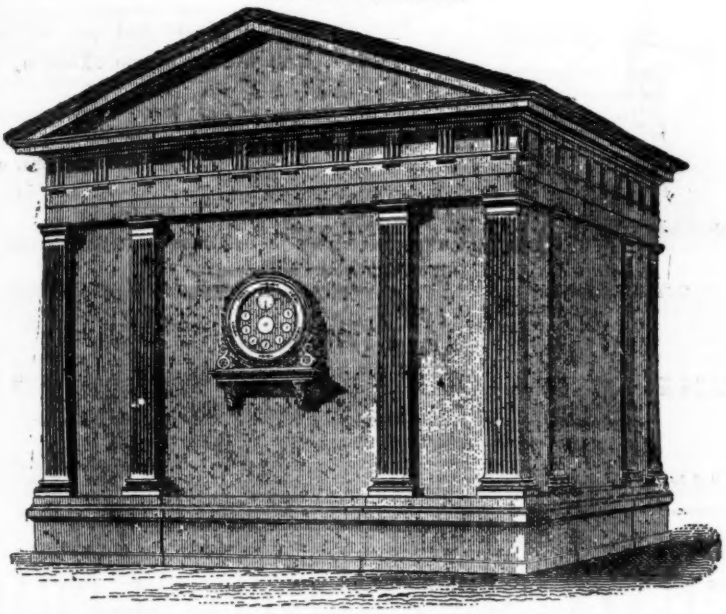

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As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather India-Rubber and Gutta-Percha Machine-Bands, Sheet and Washers and Steam Joints.

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Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

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Analysis and Price on Application.

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Supply the Best Wigan Arley Mine Gas Coal and Nuts; the Best Hand-picked Round Cannel;
ALSO SMALL OR GAS CANNEL, &c., &c.

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COAL OWNERS & MERCHANTS.
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LONDON & THE SOUTHERN COUNTIES
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GAVIN PAUL,
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Yields 10,880 cubic feet of 16·1-candle gas, and fully 13 cwts. of first-class coke per ton.

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Yields 10,200 cubic feet of 14·9-candle gas, and fully 12 cwts. of first-class coke per ton.

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HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
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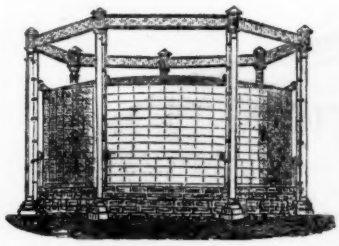

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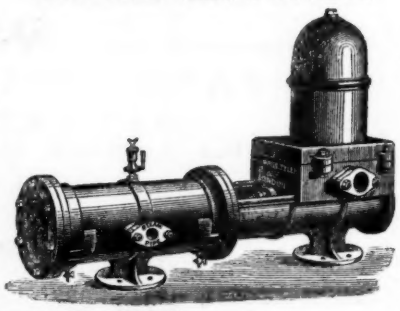

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FOR
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One selected from amongst many Testimonials received by H. T. & Co.:—

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"Sir,—The 'Universal' Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily.

"Yours truly,
(Signed) "PETER HART, *Manager.*"

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GAS COAL MERCHANT,

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GAS EXHAUSTERS,

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PURIFIERS from 4 to 40 FEET SQUARE.

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RETORT SETTERS & FITTERS SENT TO ALL PARTS.

ALL WORK AND MATERIALS GUARANTEED OF THE BEST DESCRIPTION.

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COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their

CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9290 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

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The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

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Established 1840.

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Yields 11,600 cubic feet of 34·3-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

MUIRKIRK, No. 2, CANNEL

Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

OLD WEMYSS CANNEL

Yields 12,550 cubic feet of 33-candle gas per ton.

Prices and full Analyses on application.

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THORNCLIFFE IRON-WORKS AND COLLIERIES,

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STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

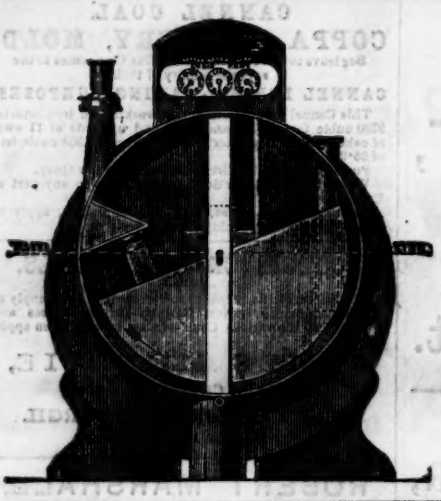
	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.



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"Unquestionably the best Water Gas-Meter now in use."—Thos. G. Barlow, C.E.

Over 90,000 in action.

MANUFACTURERS:

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WITH

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1862.

PATENT ANTIMONY PAINT.

CLASS II.

MADE ONLY BY

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This Paint having been in general use over twelve years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

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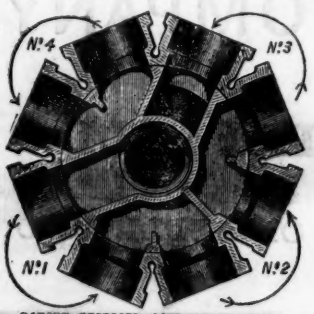

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Sectional Plan.

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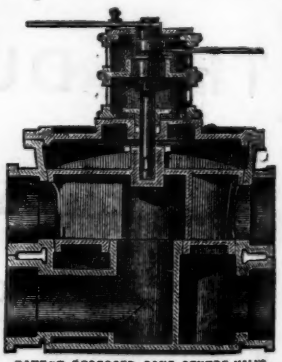

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